

Libraries of Things

Exploring business model configurations and dominant archetypes

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Abstract

As part of both the sharing and social economies, libraries of things (LoTs) can play a role in reducing consumption in a socially sustainable way. They have the potential to overcome key sustainability and service shortcomings of other circular and sharing business models (BMs), but research on LoTs is sparse. Because of this potential, this research aims to improve the understanding of LoT BMs to support their design and implementation. Empirical data was collected for 90 LoTs, located across North America, Europe, and Australia, using publicly available documentation. This was supplemented with targeted personal communications with LoT practitioners to understand their motivation and experience with specific configurations. The research outputs include an LoT BM framework with descriptive findings and examples from practice, an empirical database of BM configurations for the 90 LoTs reviewed, and four LoT archetypes with descriptive case examples. The archetypes identified are: Public-to-Citizen LoTs, Community-Driven Free LoTs, Community-Driven Paid LoTs, and Scaling Paid LoTs. These findings support practitioners in the design and implementation of LoT BMs by providing a detailed description of the configurations used and the dominant archetypes seen in practice today. They also highlight tensions between BM choices, sustainability, and financial viability, along with potential solutions seen in practice. Public and private actors were found to contribute to LoTs through not only funding, but the provision of space, inventory, and other resources. These actors can use this research to understand LoT BM choices and tradeoffs, understand examples from other contexts, and ultimately improve support for LoTs. This research also provides a foundation for many future research avenues on LoTs, using the LoT BM framework, empirical database, and archetypes developed.

Keywords: libraries of things, sharing economy, social economy, business models, sustainable consumption

Executive Summary

Background and Research Aim

The latest Intergovernmental Panel on Climate Change (IPCC) report by Working Group III stresses the urgency of making deep emission cuts across all sectors of society. Demand-side measures, including consumption reduction, are highlighted as important to reducing energy and material use while maintaining decent living standards. As part of both the sharing and social economies, libraries of things (LoTs) can play a role in reducing consumption in a socially sustainable way. They show promise as they may address a number of the rebound effects seen with other circular and sharing models in the literature. They may also increase uptake of sharing, by resolving challenges seen in other peer-to-peer sharing models. However, they face common challenges with other social enterprises, often running with limited budgets and managing a diverse resource mix, including volunteers, donations, and public and private funding. Thus, LoT business models should be designed with care to maximize their environmental and social value, while minimizing any rebound effects and maintaining financial viability. This research aims to improve the understanding of business models (BMs) for LoTs to support their design and implementation. Two research questions (RQs) were identified to address this aim:

RQ1: What business model configurations are libraries of things using today?

RQ2: What are the dominant archetypes of libraries of things?

To help LoT practitioners design BMs that advance sustainability and allow financial viability, the first step is to identify what BM configurations and archetypes exist for LoTs today. This is important for both practitioners when designing their BM, as well as public and private actors that interact with LoTs. This research can help public and private actors to identify gaps in funding and also gain inspiration from the ways other actors support LoTs today. This research can also serve as a foundation for many future research paths on LoTs.

Research Design

This research employs various methods to answer the RQs identified, depicted in Figure 0-1. A literature review, two background interviews with LoT practitioners, and my own experience as an LoT practitioner were used to develop a proposed LoT BM framework. This framework draws on research about the sharing and social economies, municipal governance, LoTs, and business models. Next, a population of 90 LoTs was identified to test and refine the proposed framework. These 90 LoTs are located across Europe (56), North America (31), and Australia (3) and represent all LoTs known to the author as of February 2022. Specialty libraries, such as toy or tool libraries, were excluded.

The population of LoTs was coded against the proposed framework using publicly available documentation, such as LoT websites, social media, reports, videos, and articles. Data was coded abductively, with new codes added as observed through document review. The document review was supplemented with five targeted personal communications with LoT practitioners, including emails and short semi-structured interviews. These were used to understand motivations for unique or uncommon configurations and to triangulate data against the literature. This data collection and analysis produced a revised LoT BM framework along with descriptive findings and examples used in practice by LoTs, and a database containing the BM configurations for each of the 90 LoTs reviewed. The database was then qualitatively analyzed to develop archetypes based on key themes from the literature and empirical data collected.

Four case LoTs (i.e., one per archetype) were selected to describe BM configurations of each archetype.

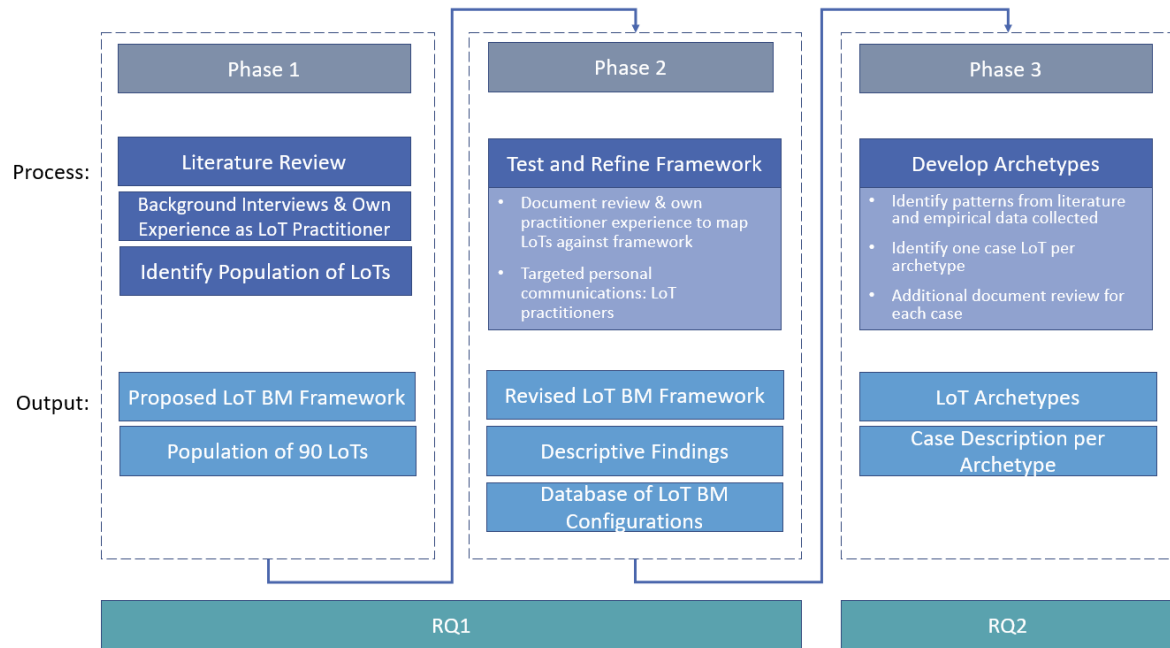


Figure 0-1 Research Design

Findings & Contributions

RQ1: What business model configurations are libraries of things using today?

The findings include an LoT BM framework based on theory and refined through empirical data collected for 90 LoTs across North America, Europe, and Australia. Based on this data, the framework was refined to include the configurations most relevant to LoTs, including new configurations that were added based on empirical data. Figure 0-2 presents the high-level framework components. In the findings section, detailed sub-frameworks and descriptions for each component are provided, with illustrative examples from a variety of LoTs.

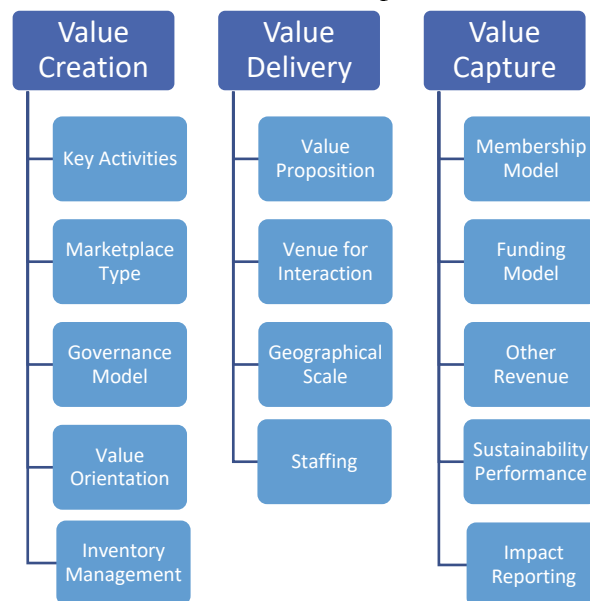


Figure 0-2 Library of Things Business Model Framework

These are significant contributions to research in the topics of the sharing economy, social economy, and LoTs. The framework builds on previous sharing and social economy research to disaggregate features that are of relevance for LoTs. This research also highlighted tradeoffs between BM choices, sustainability, and financial viability. Key areas of tensions and tradeoffs were seen across BM choices for inventory sourcing, venue for interaction, staffing, funding, other revenue, and the value proposition. Where possible, solutions to these tradeoffs seen in practice are highlighted. Another important finding was that none of the LoTs reviewed are financially self-sufficient today, despite literature pointing to this as a goal for both investors and practitioners in the social enterprise space. However, the diverse mix of BM configurations seen in practice suggest that LoTs may achieve financial *viability* through a creative and varied funding mix.

RQ2: What are the dominant archetypes of libraries of things?

Four dominant LoT archetypes were derived based on themes that emerged from the literature and from the empirical data:

1. **Public-to-Citizen LoTs:** This archetype is characterized by LoTs operating as an extension of a traditional library. All 28 LoTs in the US fit this archetype, as well as two LoTs outside the US. This archetype provides free access to items, has a formal governance model, social value orientation, and receives recurring, long-term public and private funding.
2. **Community-Driven Free LoTs:** This archetype includes business-to-consumer (B2C) LoTs that provide free, all-access memberships. These libraries are generally able to offer free memberships because they keep their costs extremely low through staffing the LoT with volunteers and through in-kind donations (e.g., inventory and/or space). They may also receive monetary donations or grants to supplement operations, but they are typically less dependent on these.
3. **Community-Driven Paid LoTs:** This archetype includes B2C LoTs that receive a mix of funding through their membership and funding models. This archetype may offer pay-as-you-go, hybrid, and/or paid all-access memberships, often with concession and/or supporter pricing options. These LoTs often employ a creative funding model, receiving funding from many sources and in many forms. The staffing mix includes volunteers and may include paid staff.
4. **Scaling Paid LoTs:** This archetype was based on one LoT with a distinct BM that offers an example of what the scaling of one LoT organization could look like. It operates with a formal governance model, a narrow range of the most popular items, paid staff, higher loan fees, and a significant and varied external funding mix.

For each archetype, one case LoT was selected, and its BM was described according to the LoT BM framework. These archetypes contribute to both knowledge and practice, advancing the design and implementation of LoT BMs.

Practical Implications

This research provides a comprehensive BM framework and empirical database that can support existing and prospective LoT practitioners to design, implement, and innovate with a BM that works in their context. There is no single “formula” to designing a LoT, and a myriad of options were observed in practice. Practitioners can refer to the detailed framework description, the empirical database, and the LoT archetypes to gain inspiration for alternative BM configurations that other LoTs have used. For instance, this may include new sources and criteria for inventory procurement and additional funding opportunities.

Public and private actors that interact with LoTs can use this research to better understand key BM choices for LoTs and the tradeoffs they face, which can lead to better support and financial viability for LoTs. These actors should take a long-term view when funding LoTs and consider both monetary and in-kind funding. Provision of in-kind funding, such as inventory or space can help the LoT to deliver a high-quality, convenient service, while keeping costs low.

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Abbreviations

B2C – Business-to-consumer

BM – Business Model

BMC – Business Model Canvas

CE – Circular Economy

CIC – Community Interest Company

CML – Curtis Memorial Library

EC – European Commission

IPCC – Intergovernmental Panel on Climate Change

LoT – Library of Things

NGO – Non-governmental Organization

PSS – Product Service System

SEAP - Social Economy Action Plan

SLC – Social Lean Canvas

SDG – Sustainable Development Goal

1 Introduction

The latest report by Working Group III of the UN Intergovernmental Panel on Climate Change (IPCC), reinforces the urgency of making deep emission cuts across all sectors of society to limit the worst effects of climate change and to secure a livable future (IPCC, 2022). Importantly, Chapter 5 stresses the importance of demand-side measures, including consumption reduction, as key to mitigating climate change while maintaining well-being (Creutzig et al., 2022). In particular, the report states with high confidence that wealthy individuals are responsible for a disproportionate share of emissions and can reduce their emissions while maintaining decent living standards (Creutzig et al., 2022). It emphasizes that reducing consumption can decouple economic growth from natural resource use while maintaining social sustainability:

Consumption reductions, both voluntary and policy-induced, can have positive and double dividend effects on efficiency as well as reductions in energy and materials use. ... strong emissions-reducing policies and strong social equity policies show that a low-carbon transition in conjunction with social sustainability is possible, even without economic growth (Creutzig et al., 2022, p.5-32).

The IPCC report and Sustainable Development Goal (SDG) 12 *Responsible Consumption and Production* stress the role of changing consumption patterns to reduce emissions and combat other environmental challenges, such as biodiversity loss (IPCC, 2022; United Nations, n.d.). SDG12 states that circular economy (CE) approaches are required in the transition toward sustainable consumption and production (United Nations, n.d.). CE is proposed as a solution to the “take-make-waste” economic system. It “aims to keep extracted natural resources in use as long as possible and seeks to preserve the maximum value of products through reuse and recovery strategies” (Hofmann, 2019, p. 361). It is suggested that CE can allow the decoupling of economic growth from natural resource consumption and can improve resilience (Hofmann, 2019). Circular business models (BMs) are proposed as a way to transform the way firms create, deliver, and capture value, so that economic value is retained in products through multiple-use cycles (Hofmann, 2019).

The sharing economy can be viewed as a subset of the circular economy. Sharing can increase the use-intensity of products and extend product lifetimes, thus slowing loops (Bocken et al., 2016; Curtis, 2021). The definition of sharing organizations varies across the literature but can generally be understood as providing access to under-utilized goods and services (Curtis & Mont, 2020). They can include for instance sharing of mobility (e.g. Turo), space (e.g. AirBnB), and goods (e.g. the Toronto Tool Library) (Curtis, 2021). While many different types of sharing BMs exist, some suggest that uptake of sharing has been slow. Ameli (2017) finds a high willingness to share amongst society, but low rates of sharing in practice, especially for goods-sharing. She points to challenges with service design as one culprit, noting that some sharing offers are inconvenient and require too much effort by the user to engage. It is therefore important to design sharing business models that provide a compelling user experience.

While these business models can serve as an important path to sustainable consumption and production, their sustainability merits have been questioned. Thus, when designing business models in this realm, it is important to design for sustainability to achieve the goals of decoupling, resilience, and net environmental and social benefit. Two key criticisms of the circular and sharing economies are 1) the potential for rebound effects, and 2) a poor understanding of the social dimension of sustainability in circular BMs.

First, research point to potential rebound effects as a major concern for sustainability (Bocken et al., 2016; Curtis, 2021; Curtis & Mont, 2020; Hofmann, 2019). Rebound effects describe the

phenomenon where emission and resource savings may be diminished or erased by other consumer activities (Druckman et al., 2011). For instance, consumers may save money by renting instead of buying a product, but then spend those savings on other high-emission activities (e.g., flying). Similarly, sharing organizations may create artificial idling capacity of goods by buying more product than the market demands (Curtis & Mont, 2020). For example, a bike-sharing boom in China led to bike-sharing platforms saturating the market and competing on convenience and accessibility, resulting in artificial idling capacity, and eventually bike graveyards when the platforms liquidated (Curtis & Mont, 2020; Taylor, 2018).

Second, circular and sharing BMs are criticized for their effect on the social dimension of sustainability. In a review of 42 articles of circular BM literature, Hofmann (2019) notes an “absence of the social dimension” (p. 367), with no discussion of solutions for overcoming shortfalls in social sustainability or for integrating social considerations into circular BMs. A recent policy brief from the European Commission (EC) and OECD echoes that the social dimension of circular BMs is less understood (European Commission & OECD, 2022).

Considering these criticisms, care should be taken to design circular and sharing BMs that minimize rebound effects and bolster social sustainability. Suggested measures to address rebound effects include: 1) pairing consumer education with the product or service to raise awareness about over-consumption (Hofmann, 2019), 2) creating value propositions based on sufficiency and slow consumption (Hofmann, 2019), and 3) limiting sharing to a stock of existing goods (i.e., not buying new goods to facilitate sharing) (Curtis & Mont, 2020). To address the social dimension, Curtis & Mont (2020) suggest that a sharing organization should operate as a platform, facilitating sharing in a multi-sided market, thus excluding business-to-consumer (B2C) models. They suggest that this condition will encourage more community connection and social cohesion.

Another important actor to consider when addressing the social dimension of circular BMs is social economy organizations. Social economy organizations focus on generating social and/or environmental value rather than profit, reinvesting most earnings back into their mission (European Commission, 2021). Recent attention from policymakers highlights the role of social economy organizations in advancing the CE while reinforcing social benefits. In December 2021, the EC announced the Social Economy Action Plan (SEAP) to support social economy organizations. The SEAP recognizes the social economy’s “contributions to a fair and inclusive recovery, and the green and digital transitions” (European Commission, 2021). In a subsequent policy brief, the EC and OECD highlighted how the social economy can complement and accelerate the transition to a circular economy (European Commission & OECD, 2022). It finds that the social economy can be “a valuable tool to build circular business models, increase social acceptance of circular products” (p. 6) and to strengthen the social dimension of circular economy initiatives. As part of the SEAP, the EC will launch a study of social economy organizations in the EU to improve understanding of these entities.

Libraries of things (LoTs) are a type of innovative circular BM at the intersection of the sharing and social economies and can therefore play an important role in advancing sustainable consumption in a socially sustainable way. LoTs extend the concept of sharing books to other goods (Baden et al., 2020). They can operate as an extension of a traditional library or as a separate entity. Even though they do not operate as a platform as suggested by Curtis & Mont (2020), LoTs often emphasize the social side of sustainability in their missions (e.g., social justice, inclusivity, localism, etc.) (Baden et al., 2020). LoTs benefit communities by adding diversity to how the community’s needs are met, contributing to resilience and social cohesion. They also reflect Hofmann’s (2019) suggestions to minimize rebound effects. LoTs often

include an educational component, hosting workshops and advocating for changes in consumption patterns (Ameli, 2017; Baden et al., 2020).

LoTs are also suggested as an avenue to normalize sharing, and to close the gap between willingness to share and sharing in practice (Ameli, 2017; Baden et al., 2020). Ameli (2017) suggests that LoTs can overcome challenges seen in peer-to-peer sharing by providing a centralized party responsible for facilitating sharing and maintaining the quality and safety of shared goods. In this way, LoTs have the potential to increase acceptance of the sharing economy and accelerate the transition to a circular economy.

However, LoTs face common challenges with social economy organizations when designing their business models. LoTs are often formed as bottom-up movements, stocked with inventory from donations, and run by volunteers with little to no budget (Ameli, 2017). As a result, resource constraints can limit the LoT's value proposition. Curtis' (2021) research on sharing economy BMs finds that BMs for goods-sharing are more diverse than other modes of sharing (e.g., space or mobility). He further notes that "sharing platforms with environmental, social, or societal value orientation struggle to remain financially viable" (Curtis, 2021, p. 1661). Because LoTs prioritize non-economic value (Baden et al., 2020) and aim to keep prices low to remain accessible (Ameli, 2017), they may struggle with financial viability, which could put their missions at risk. Indeed, this comes back to a common challenge in the environmental sphere, where society tends to prioritize economic value, with less recognition of environmental or social value (Petrescu et al., 2021). Policymakers seem to recognize this, i.e., as evidenced by the SEAP. The SEAP has called for research into social economy organizations to better understand and support these organizations.

1.1 Problem Definition

As part of both the sharing and social economies, LoTs can play a significant role in reducing consumption in a socially sustainable way. They show promise as they address a number of the rebound effects seen with other circular and sharing models in the literature (Bocken et al., 2016; Curtis & Mont, 2020; Hofmann, 2019). They may also increase uptake of sharing, by resolving challenges seen in other peer-to-peer sharing models (Ameli, 2017). However, they face common challenges with other social economy organizations, resulting in diverse business models that may struggle with financial viability (Baden et al., 2020; Curtis, 2021). Further, as evidenced by sharing economy literature, sharing is not sustainable by default (Curtis & Mont, 2020), and thus business models should be designed with care to avoid negative sustainability impacts while still achieving financial viability.

Thus, for LoTs to survive and grow, research is needed to identify BMs that can achieve social and environmental sustainability while supporting financial viability (Curtis, 2021; Martin et al., 2015). Many LoTs fail to make a traditional business case, as much of the value generated is less tangible and difficult to quantify in monetary terms, falling outside of their direct program-revenue (Petrescu et al., 2021). Beyond this, LoTs place a strong emphasis on accessibility and thus strive to keep borrowing fees low, which makes it difficult to cover costs (Ameli, 2017). In turn, this means that LoTs often are not financially self-sufficient and rely on outside funding, which may be time-limited (Baden et al., 2020; Martin et al., 2015). Investors often provide start-up funding with the expectation that the organization will become financially self-sufficient. This often leads to social economy organizations, such as LoTs, becoming more commercially oriented out of necessity (Martin et al., 2015). It can also put the organization's long-term viability at risk if they lose a funding source or key stakeholder support (Petrescu et al., 2021). Thus, it is worth researching BMs for LoTs to understand how they are designed and implemented today. This may not mean financial self-sufficiency but rather viability, i.e., striking a balance between traditional revenue and external funding (Moskovitz, 2020). This research

would benefit LoT practitioners in designing, implementing, and experimenting with their BM. It would also help policymakers such as the EC understand how to better support LoTs, as an important part of the social and circular economies.

The existing literature on BMs for sharing organizations is limited, with the majority focused on the cases of AirBnB and Uber and insufficient attention to other models (Curtis, 2021). Curtis (2021) studied sharing BMs, identifying 93 BM configuration options and eight sharing organization archetypes. In this research, Curtis (2021) noted that BMs for goods-sharing were more diverse. Curtis' (2021) research included one tool library, but no other LoTs were included.

There is otherwise limited research dedicated to LoTs, with only two known academic papers covering LoT BMs (Ameli, 2017; Baden et al., 2020). Ameli (2017) studied LoTs existing at the time of her study (58) via surveys of LoT providers, as well as opinions of German citizens on sharing generally. She identified several gaps and tradeoffs between what users wanted and what LoTs were able to provide with limited resources, pointing to the need for future research on solutions to address the gaps. My research will seek to advance knowledge in this area by gathering empirical evidence on how a large population (90) LoTs are structuring their BMs in practice, and whether there are any examples that address the challenges identified by Ameli (2017). More recently, Baden et al. (2020) performed a case study of six LoTs in the UK to understand their BMs and challenges. While this provided valuable insights, it was limited to a small number of LoTs in a narrow geographic context. My research will look at a larger population of LoTs across a wider geographic context (North America, Europe, and Australia).

1.2 Aim and Research Questions

Based on the research problem outlined in the previous section, the aim of my thesis will be to improve the understanding of BMs for LoTs to support their design and implementation. To address these aims, the proposed research questions are:

RQ1: What business model configurations are libraries of things using today?

RQ2: What are the dominant archetypes of libraries of things?

To help LoT practitioners design BMs that allow financial viability and advance sustainability, the first step is to identify what BM configurations and archetypes exist for LoTs today. As sharing organizations are not sustainable by default, it is important to understand how the different BM configuration choices interact and affect sustainability and financial viability. This is important for both practitioners when designing their BM, as well as public and private actors that interact with LoTs. This research can help public and private actors to identify gaps in funding and also gain inspiration from the ways other actors support LoTs today. This research aims for breadth, describing the current state of LoT BMs today. It can serve as a foundation for many future research paths on LoTs.

1.3 Scope and Delimitations

The scope of this research includes mapping all LoTs known to the author as of February 2022 against a proposed LoT BM framework described in Section 2.7.1. The proposed framework was developed based on the literature review and two background interviews. Specialty LoTs, such as tool or toy libraries, are excluded. These were excluded primarily because one of the key challenges for LoT BMs is managing the diverse range of items offered, thus "full-range" LoTs carrying a wide range of items were more relevant to study from an academic and practitioner perspective. The resulting population consists of 90 LoTs across North America, Europe, and Australia. Language was a limitation in identifying the population of LoTs, and thus this population may be understated, and some geographic contexts may be missed.

Data was collected for each LoT using secondary sources, according to the proposed LoT BM framework (Section 2.7.1). Sources include the LoT's website, social media, reports, videos, and articles. Data collection was based on the BMs in use by the LoT at the time of collection (January to March 2022) and BM changes that had been announced at that time. Historical BM configurations were not considered. This data was supplemented with targeted personal communications (semi-structured interviews and emails) with five LoT practitioners. These personal communications were used to understand motivation and experience with less common BM configurations and to triangulate findings against the literature. The data collected was analyzed to test and refine the proposed framework, describe BM configurations in use today, and to develop LoT BM archetypes.

Use of secondary data is consistent with previous empirical research on BMs (Curtis, 2021; Täuscher & Laudien, 2018). It was deemed a suitable method as it allows for a review of a high number of LoTs and allows for consistent data collection. The latter is particularly important when conducting research on a newer type of entity, such as LoTs, where underlying definitions may be unfamiliar to the subject entities. Disadvantages of relying on secondary data include incomplete materials, potential inaccuracies in the data, and time required to search for information in at times hard-to-find places (Creswell & Creswell, 2018). Missing data was supplemented to some degree with targeted personal communications, though it was not feasible nor necessary to complete all missing information this way. The focus of this research was on breadth over depth, aiming to review a high number of LoTs to describe the current state of their BMs.

1.4 Ethical Considerations

1.4.1 Researcher honesty and personal integrity

While this research is not funded, I have volunteered as the Technology & Finance Officer at Circle Centre, a LoT in Lund, Sweden. No organization, including Circle Centre, is in a position to influence results of this research. To ensure this research is not biased by Circle Centre's needs or experiences, the research was designed to draw upon a broad range of LoTs.

1.4.2 Ethical responsibilities to research subjects

All personal communications (interviews and emails) were conducted on a voluntary basis. The purpose of the communication was shared, and consent was obtained from participants. See Appendix C for the consent form provided to interviewees.

1.4.3 Data Handling & Storage

Personal data such as name, email, and personal opinions, were collected through interviews, though no *sensitive* personal data was collected. Personal data is stored in an encrypted format on both a hard drive and on a cloud service.

1.5 Audience

This research is intended for academics, current or prospective LoT practitioners, and the public and private actors that interact with LoTs. First, academic research gaps include a need for additional knowledge of LoTs, especially regarding their BMs (Ameli, 2017; Baden et al., 2020; Curtis, 2021). My research will advance knowledge on BM configurations for LoTs, as there is limited research in this area. Second, LoT practitioners can use this research to understand what BM configurations other LoTs are using, how these configuration choices affect the LoT's sustainability and financial viability, and the dominant LoT archetypes. This can support practitioners in designing, implementing, and/or experimenting with their BM to find a suitable option that is both financially viable and true to their values. Lastly, public and private actors

that interact with LoTs can use this research to understand LoTs' unique BMs and identify areas to offer support. The EC recently released the Social Economy Action Plan, indicating strong interest in understanding how social economy organizations (including LoTs) operate. This includes an initiative to collect qualitative and quantitative data on social economy organizations in the EU (European Commission, 2021), thus this research would be of interest to the EC. Policymakers outside the EU can use this research to understand what challenges LoTs face and how to better support them.

1.6 Disposition

Section 1 presents background and context on the research topic area, then discusses the specific problem, aim and research questions addressed. The chapter then identifies research limitations, discusses ethical considerations, describes the intended audience, and provides a thesis outline. **Section 2** presents a literature review, where the sharing economy, social economy, LoTs, business models, and financial viability are explored. Next, relevant conceptual frameworks are highlighted, before arriving at the proposed LoT BM framework. **Section 3** presents the research design and methodology for the study. **Section 4** presents the findings and analysis of the research, including the revised LoT BM framework and the dominant archetypes identified. **Section 5** presents a discussion of the findings against previous knowledge in the field and discusses implications of limitations in how the results should be interpreted. **Section 6** presents the main conclusions of the work, practical implications, and recommendations for future research.

2 Literature Review

The literature review included sources related to the sharing economy, the social economy, and LoTs, with a focus on the BMs of these organizations. The sources covered a variety of geographic contexts and emerged primarily from the disciplines of business management, economics, and policy, though several were interdisciplinary in nature. The following sections will discuss key concepts, knowledge, and frameworks encountered. This section will end with a summary of the research gaps and a proposed analytical framework to guide the research.

2.1 The Sharing Economy

The sharing economy, as a subset of the circular economy, can play an important role in sustainable consumption by slowing resource loops through extending the lives of products and increasing use-intensity of goods (Bocken et al., 2016). Sharing organizations may include sharing of physical goods, space, and mobility (Curtis & Mont, 2020). Researchers often include community repair organizations in the scope of sharing as well, since these organizations share tools and knowledge (Arabi et al., 2018; Riggers & Schickner, 2017; Voytenko Palgan et al., 2021).

Access over ownership of goods is argued to reduce net production and consumption, thus reducing related resource use and greenhouse gas emissions (Baden et al., 2020; Curtis & Mont, 2020). However, Curtis & Mont (2020) suggest that while sharing economy organizations can contribute to sustainable consumption, they are not sustainable by default, with concerns centered around rebound effects and social sustainability. Research indicates the potential for rebound effects could diminish environmental benefits or even increase net consumption (Bocken et al., 2016; Curtis, 2021; Curtis & Mont, 2020; Hofmann, 2019). To address rebound effects, Hofmann (2019) suggests pairing consumer education with the product or service to raise awareness about over-consumption and creating a value proposition based on sufficiency and slow consumption. Curtis & Mont (2020) suggest that sharing organizations must “leverage idling capacity of an existing stock of goods” and “must not purchase new goods for the purpose of facilitating sharing” (Curtis & Mont, 2020, pp. 6–7). These parameters are included to increase the use-intensity of existing goods and to avoid generating *artificial* idling capacity. They also suggest that it is more resource-efficient to facilitate temporary access rather than ownership (i.e., lending over swapping or secondhand shops). Another suggested criterion is that the motivation for ownership should be non-pecuniary (i.e., not motivated by money). Lastly, they exclude B2C models and suggest that sharing economy BMs should operate as a platform in a multi-sided market. They suggest that multi-sided platforms will promote the social dimension of sharing more than B2C models would. Regarding the social dimension of sustainability, a recent policy brief from the European Commission & OECD (2022) notes that the environmental benefits of circular BMs (including sharing BMs) has been “validated to some extent but there is still a lack of understanding of their social impact” (p.6). The social dimension will be discussed further in Section 2.2.

Research on the sharing economy has largely focused on the cases of AirBnB and Uber (Curtis & Mont, 2020). For sharing organizations to survive and grow, research is needed to identify BMs that ensure long-term financial viability (Curtis, 2021; Martin et al., 2015). Curtis (2021) expanded on sharing platform research, studying BMs across 63 sharing organizations. In this research, Curtis (2021) noted that BMs for goods-sharing were more diverse. LoTs are a type of community goods-sharing organization that are relatively new, with most founded in recent years (Ameli, 2017). Curtis’ (2021) research included one tool library, which can be viewed as a specialty LoT (discussed further in Section 2.3). Otherwise no LoTs were included in Curtis’ (2021) research. There are a few studies specific to LoTs and other lending libraries by others

(Ameli, 2017; Baden et al., 2020; Ozanne et al., 2019), but additional research is needed to support LoT BM design and implementation.

2.2 The Social Economy

A recent policy brief from the European Commission & OECD (2022) highlights the social economy's contributions to the circular economy and the green transition. The EC defines social economy organizations as “entities which put social and environmental purposes first, reinvesting most of their profit back into the organisation” (European Commission, 2021). The EC & OECD stress that the social economy can “reinforce the social benefits of the circular economy” and that it can be “a valuable tool to build circular business models, increase social acceptance of circular products ... and help the green transition to be fair and inclusive” (European Commission & OECD, 2022, p. 6). As mentioned in the previous section, the social dimension of circular economy organizations is less understood than the environmental dimension.

Social enterprises are a type of social economy organization (European Commission, 2021). Other literature refers to social enterprises and social economy organizations as the “hybrid” or “third” sector. Some definitions consider charities to be separate from social enterprises, with the key distinction that charities fully rely on fundraising activities, whereas social enterprises may rely on some external funding but seek “self-sustainability” through the sale of products, services, or other interventions (Social Business Design, 2020). Policymakers may still include charities as a type of social enterprise. Their goal is to support organizations, regardless of legal form, which generate social and environmental value and may not be financially viable otherwise. For instance, the EC notes that there is no single legal form for social enterprises, and they may take the form of social cooperatives, non-profits, charities, etc. (European Commission, n.d.).

Martin et al. (2015) note that social economy literature has been devoting more attention to hybrid organizations. These organizations are emerging around the globe to fill a gap in the traditional market economy and government services amid changing social challenges (European Commission & OECD, 2022; Otola et al., 2021). Wang (2018) notes that social enterprises are “generally small in scale, short in time, and immature in their mode of operation” (p. 1705). The literature on LoTs indicates many take the form of social enterprises and share common challenges (Baden et al., 2020).

The European Commission & OECD's (2022) policy brief notes that social economy organizations structure their BMs differently than traditional organizations, with an emphasis on the local context, collaboration, and long-term social and environmental goals. They typically draw upon a diverse set of resources (e.g., volunteers, donations, grants, and direct revenue from sales) from multiple sources (e.g., public sector, private sector, and individuals). Through these unique BMs “the social economy designs, experiments and implements innovative ways to organise economic activity in an inclusive and sustainable way, thereby inspiring responsible practices that transform the economic system” (European Commission & OECD, 2022, p. 16). Examples of social enterprise activities that advance the circular economy include:

- Experience developing circular activities, especially in the areas of repair, reuse, recycling, and sharing
- Making circular services, products, and education accessible for all, especially for those of a low socioeconomic status
- Rallying support and acceptance of circular goods and services by local actors, and

- Contributing to social capital, cohesion, and a sense of community by providing opportunities for local engagement (European Commission & OECD, 2022).

While there is a strong case for the environmental and social value generated by social enterprises, it is difficult for them to compete in traditional financial markets with commercially oriented enterprises (Otolá et al., 2021; Wang, 2018). Part of the reason that these organizations fail to make a traditional “business case” and remain financially viable is that much of the value they generate is “invisible” using our current market measures (European Commission & OECD, 2022; Petrescu et al., 2021). In other words, they are being assessed on economic value generated, when their focus is on generating environmental and/or social value. Some research has contributed toward quantifying the positive social externalities generated by social enterprises. Ozanne et al. (2019) studied the social benefits of toy libraries in Australia. They measured which demographics used the libraries (e.g., children with special needs, immigrants), educational programs for at-risk children, and number of active community members. Further, they captured monetary value for a few measures, such as the value of donated toys and donated services.

Petrescu et al.’s (2021) study on R-urban, takes the valuation of social and environmental benefits even further. R-urban was a social hub on the outskirts of Paris. Petrescu et al. (2021) calculated “invisible” indirect value (e.g., volunteer hours, cost savings) generated by the hub’s activities. Their study found that the invisible value was ten times greater than the visible value (i.e., direct revenue). They further found that “the bulk of benefits rippled out to the state (68%) and the planet (16%) as costs saved because of the ecological and human wellbeing effects R-Urban produced” (p. 171).

In sum, despite lower direct economic value, social enterprises have the potential to contribute to circular economy initiatives, strengthen the social benefits of such initiatives, fill critical gaps in government and market activities in an innovative and entrepreneurial way, and can generate substantial non-economic value. LoT’s often share the challenges of social enterprises; thus, this literature is relevant to draw upon for this research.

2.3 Libraries of Things

LoT’s can be viewed as a subset of the sharing and social economies, extending the concept of lending books to other goods (Baden et al., 2020). A simplified mode of service is presented in Figure 2-1. Ameli (2017) describes LoT’s as a product service system (PSS). Curtis (2021) similarly notes that sharing economy BMs can take the form of use-oriented PSS, by providing access instead of ownership. However, PSS may have a more commercially oriented tone than LoT’s wish to be associated with, as was noted in one background interview [R1].

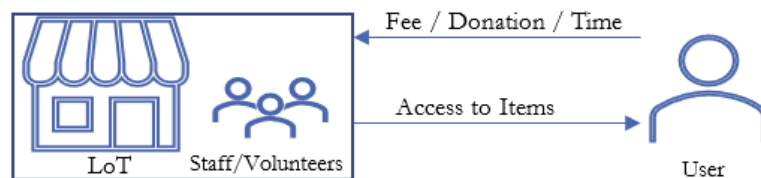


Figure 2-1 Simplified Mode of Service. Adapted from Ameli (2017).

LoT’s may offer a wide variety of “things” in their inventory, whereas some are more specialized (e.g., tool or toy libraries) (Baden et al., 2020). Some researchers group these together as “libraries of things” (e.g., Baden et al. (2020)) while others break them out as separate types of libraries (e.g., Ameli (2017)). For purposes of this research, I will focus on LoT’s carrying a

diverse range of items, excluding specialty libraries. LoTs often take the form of social enterprises (Baden et al., 2020) or may be government-operated or hosted in a public-to-citizen format (Curtis, 2021; Voytenko Palgan et al., 2021) (e.g., as part of a traditional library).

Ameli (2017) studied LoTs as a possible solution for the gap between a high societal willingness to share and a low practice of sharing in reality. She studied the potential of LoTs to close the “sharing gap” by surveying all known LoTs (58) at the time and by surveying German citizens about the conditions under which they would use an LoT. The main value proposition she suggests is in line with Curtis (2021): that LoTs can reduce the transaction costs of sharing. Ameli (2017) suggests that LoTs have the potential to overcome shortcomings and transaction costs of peer-to-peer sharing by providing a centralized organization that acts as the “in-charge,” guarantor and facilitator of the sharing process. LoTs can be seen as a trusted entity compared to an unknown individual in a peer-to-peer exchange. The LoT takes on the responsibility of collecting and maintaining items, performing safety checks (increasing user trust), offering exchanges at set opening hours (as opposed to users needing to schedule exchanges themselves), and can answer the borrower’s questions about the item. Ameli (2017) does caution, however, that LoTs should design their service in the most convenient way possible, to keep transaction costs low. Her research pointed to several additional considerations for developing a compelling service offering, some of which were echoed by Baden et al. (2020). These will be highlighted in Section 2.4.

LoTs have the potential to encourage individuals to engage in the sharing of under-utilized goods, thus potentially realizing the environmental benefits of the sharing economy discussed in Section 2.1. Beyond the potential environmental benefits, many LoTs extend their mission and values to social and broader societal challenges. For instance, they may challenge consumption patterns and the growth paradigm, address social justice issues, and advocate for localism (Baden et al., 2020; Curtis, 2021). Combining the social and environmental aspects, LoTs may offer add-on services such as repair cafés, where knowledge and tools are shared to teach individuals how to repair their broken items (Baden et al., 2020; Curtis, 2021). LoTs are an excellent example of the synergies between the circular and social economies, discussed in Section 2.2. It is worth noting that while LoTs may promote these values and other actors (e.g., municipalities) may choose to fund LoTs for these reasons, consumers may be motivated by other values. Ameli (2017) found that while the social elements were important to users, “ecological aspects seem to be rather unimportant” (p. 53300).

2.4 Business Models for Libraries of Things

LoTs face many BM challenges based on their unique position in the “third sector” (Samuel, 2018), including resource constraints that in turn may limit their value proposition (Baden et al., 2020). Curtis (2021) illustrates the potential diversity of BMs in the context of sharing organizations, identifying 95 configuration options across 17 different BM attributes, then identifying eight dominant archetypes. Of these archetypes, the “Collaborative Community Platform” archetype aligns most closely with LoTs. Key features of this archetype include collaborative governance, a local scale, and environmental and societal change ambitions. Revenue comes in the form of contributed volunteer labor, membership fees, resource use, donations, public funding, and private funding. Curtis’ (2021) study included one tool library and no general LoTs. My research will thus contribute to the understanding of LoT BMs by studying these organizations exclusively.

There were common challenges identified in the literature across social enterprises broadly, as well as sharing organizations and LoTs. Indeed, Baden et al. (2020) observed that challenges faced by LoTs are compounded by those associated with social enterprises. They point to a gap in circular BM literature, stating that social enterprises as a business form are underexplored.

This is also reinforced by the EC'S SEAP, which has launched an initiative to collect qualitative and quantitative data to improve understanding of the social economy in the EU (European Commission, 2021).

The extent to which LoTs rely on paid staff and volunteers can vary. Ameli (2017) notes that most LoTs are the result of a bottom-up movement started by volunteers with little to no budget. On the other hand, Baden et al. (2020) found that while some LoTs rely on volunteers, some may use primarily paid staff (e.g. Library of Things Ltd. (London, UK)). While the dependence on volunteers can help keep costs low, it can bring a new set of challenges (Ameli, 2017; Raggars & Schickner, 2017). For instance, difficulties in recruitment, motivation, mismatches of skillsets, and lack of prolonged commitment can negatively affect the LoT's service offering (Baden et al., 2020; Ozanne et al., 2019; Raggars & Schickner, 2017; Samuel, 2018). It can also restrict the services offered by LoTs, such as the opening hours and social events (Ameli, 2017).

LoTs may include e.g., sewing machines, pressure washers, tools, and musical instruments in their inventory (Baden et al., 2020). Baden et al. (2020) find that LoTs covering a wide range of items may experience a tradeoff between external attractiveness and internal complexity. That is, a diverse range of items can attract more members, but the staff time and know-how to maintain it can increase complexity and reduce time available for other tasks. LoTs may purchase inventory and/or source it through donations (Ameli, 2017). While donated items can build up inventory while keeping costs low, it can pose challenges as well. In a survey of German citizens, Ameli (2017) found that users tend to be willing to donate items of low quality, while simultaneously expecting high quality and low prices of LoT items available for borrowing. LoT providers echoed concerns around the low quality of donated items. To encourage donation of higher quality items, Ameli (2017) suggests that LoTs could accept donations of a temporary nature, where the owner has the option to take the item back later. Given quality concerns and difficulty in maintaining a wide range of donated items, Library of Things Ltd. (London, UK) decided to focus on a limited range of the most popular items and switched to sourcing new, high quality items instead of used (Baden et al., 2020). While this can be more practical on the staffing side and bolster user confidence in item quality, it may be less sustainable, as it creates artificial idling capacity (Curtis & Mont, 2020).

The location and convenience of the LoT is also an important consideration. Ameli (2017) finds that LoT users prefer short travel times and a central location, though this can be difficult for LoTs to achieve. LoTs struggle to afford high rents while keeping borrowing fees as low as users expect (Ameli, 2017). The provision of space by the government or other funders was identified as key to the success of some LoTs in Baden et al.'s (2020) study.

Collectively, these trade-offs between cost, revenue streams, and level of service can lead to a "chicken and the egg" scenario (Baden et al., 2020). A lack of resources (e.g., volunteers), high quality items, and/or desirable locations limit the services offered, and therefore the customer value proposition is weak and may only attract those with a shared ethos.

2.5 Financial Viability & Risks of Scaling

Themes such as financial self-sufficiency, financial sustainability, or financial viability were mentioned across the literature analyzed (Arabi et al., 2018; Baden et al., 2020; Curtis, 2021; Martin et al., 2015; Ozanne et al., 2019; Raggars & Schickner, 2017; Samuel, 2018) and was also noted in a background interview [R1]. Self-sufficiency can be interpreted as the organization supporting itself through its own revenue-generating activities, without outside funding. Financial sustainability and viability are interpreted as more or less synonymous. For purposes of this research, I will refer to the concept as "financial viability." Financial viability allows for

a mix of outside funding and revenue generated through the organization's activities (Curtis, 2021; Moskovitz, 2020). Though, outside funding will need to be sufficiently predictable and reliable in order to be considered viable.

Curtis (2021) notes that sharing organizations may struggle to become financially viable while maintaining their core social and environmental values. Echoing this, Martin et al. (2015) note that social enterprises “may initially have ambitions to play a role in system change that come to be displaced by more immediate concerns (such as the need to generate revenue and survive)” (p. 248). Amongst the papers analyzed and one background interview [R1], there was interest in achieving financial self-sufficiency from both investors and from the social enterprises themselves, often stemming from similar motivations (Baden et al., 2020; Martin et al., 2015; Raggars & Schickner, 2017). Funding from investors is often provided in the start-up stages with the assumption that the organization will eventually become financially self-sufficient (Martin et al., 2015; Raggars & Schickner, 2017). Martin et al. (2015) observes this in a case study of Freegle¹. Freegle explains that innovation funders and grant applications consistently focused on the plan for self-sufficiency, leading Freegle to become more commercially oriented out of necessity. Another motivator for social enterprises to achieve financial self-sufficiency is because overreliance on outside funding can be risky. For example, if political leadership changes and the investor no longer values the social enterprise, it can cease to exist (Petrescu et al., 2021).

The trend toward commercial orientation risks deviations from the organization's core values (Baden et al., 2020; Curtis, 2021; Martin et al., 2015). Several authors questioned whether these organizations should be required to fit the typical for-profit path of financial self-sufficiency and the growth paradigm (Baden et al., 2020; Martin et al., 2015; Raggars & Schickner, 2017).

The European Commission & OECD (2022) policy brief warns of the risk of mission-drift and proposes a few ways to scale while limiting this issue. First, it suggests alternative growth strategies, such as diversifying activities rather than growing the size of the organization. In the case of LoTs, this may include value-add services beyond goods-sharing, such as repair workshops and other skill-sharing events (Baden et al., 2020). Second, the policy brief suggests that social economy organizations can employ the “strawberry field strategy.” In this strategy, “social economy organizations remain local while actively encouraging replication in other territories” (European Commission & OECD, 2022, p. 26). Other options may include securing longer-term funding (as proposed by the EC's SEAP) or for municipalities to operate LoTs as an extension of traditional libraries (i.e., “public-to-citizen” format suggested by Curtis (2021) and “city as a provider” suggested by Voytenko Palgan et al. (2021)).

2.6 Conceptual Frameworks of Relevance to LoTs

2.6.1 Business Models

One might question whether BM frameworks are appropriate to apply to LoTs since they are not typical profit-seeking enterprises. Curtis & Mont (2020) argue that value capture in the context of BMs should include social and environmental value in addition to traditional economic value. They “...suggest sustainable BMs describe how businesses, non-traditional organisations and grassroots initiatives function in order to reduce negative environmental and social impacts, while maintaining economic viability” (Curtis & Mont, 2020, p. 2). This is the definition I will follow for this research, as it provides a holistic description of BMs. It covers

¹ Freegle is a grassroots online sharing platform that facilitates gifting of underutilized goods to others (Martin et al., 2015).

the type of value LoTs generate and recognizes financial viability rather than a focus on profit maximization.

There are many frameworks and templates for BMs in the literature. A seminal work on the topic is Osterwalder & Pigneur's (2010) business model canvas (BMC). They define a BM as describing "the rationale of how an organization creates, delivers, and captures value" (p.14). The BMC identifies nine key building blocks of BMs: customer segments, value proposition, channels, customer relationships, revenue streams, key resources, key activities, key partnerships, and cost structure.

Many others have adapted the BMC or used elements of it when analyzing BMs. Some have modified BM frameworks to better capture non-economic value such as social activities (Moskovitz, 2020; Otolá et al., 2021; Petrescu et al., 2021), environmental sustainability (Curtis, 2021; Otolá et al., 2021), and attributes specific to the sharing economy (Curtis, 2021; Curtis & Mont, 2020).

It is also common in BM research to develop archetypes. In Bocken et al.'s (2014) research to develop sustainable BM archetypes, they describe the purpose of archetypes as "groupings of mechanisms and solutions that may contribute to building up the BM for sustainability" (p. 42). Bocken et al. (2014) derive archetypes qualitatively based on key themes in the literature, and set parameters that archetypes must be "clear and intuitive, mutually exclusive and explanatory, but not overly prescriptive" (p. 45). Curtis (2021) develops archetypes for sharing economy BMs, highlighting their contribution to addressing the design-implementation gap for sharing economy BMs. He develops the archetypes quantitatively using cluster analysis (methods to be further discussed in Section 3.3.3).

Social & Environmental Activities

Otolá et al. (2021) find that there is little research focusing on social enterprise BMs that combine economic and social activities. One framework to capture the social and environmental activities is the social lean canvas (SLC). The SLC builds on previous work, where the BMC was adapted to the lean canvas (a simplified one-page version of the BMC (Leanstack, n.d.)), then further adapted to social enterprises, with a focus on purpose and impact (Moskovitz, 2020). The SLC is depicted in Figure 2-2. The financial sustainability (i.e., viability) field is of particular relevance for LoTs based on the literature review. This acknowledges both traditional revenue models (i.e., direct program revenue) and funding models (Moskovitz, 2020).

In terms of quantifying social and environmental value, the R-urban Framework, which builds on the Community Economy Return on Investment (Gibson-Graham et al., 2013), was used to value a social hub on the outskirts of Paris (Petrescu et al., 2021). The R-urban Framework calculates return on investment for a social hub using direct program revenue, as well as what is typically missed by traditional economic metrics: the value of volunteering, the value of increased individual capacity, and estimated cost savings to various parties (e.g., the state and the planet).

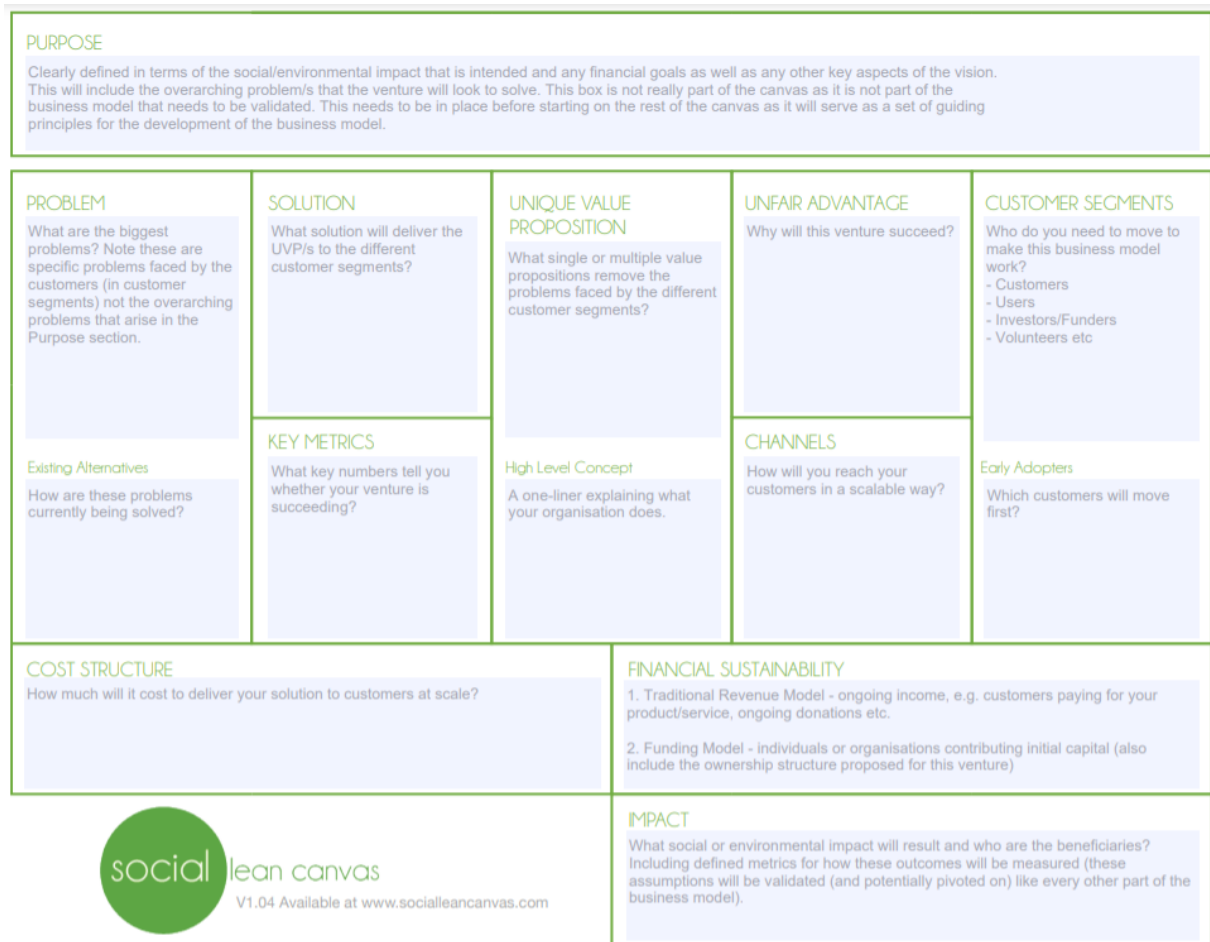


Figure 2-2 "The Social Lean Canvas," by D. Moskovitz, 2020. CC BY-SA 3.0. <https://dave.moskovitz.co.nz/files/2020/05/SocialLeanCanvas.v5.pdf>.

Sharing Organizations

Curtis & Mont's (2020) and Curtis' (2021) BM frameworks build on the BMC and on platform BM research (Täuscher & Laudien, 2018). Curtis & Mont (2020) depart from the BMC, using a morphological analysis to create a sharing economy business modelling tool, centered around the facilitation, delivery, and capture of value. Within these categories, they describe specific BM attributes and configuration options, thus better supporting implementation when compared to more abstract tools like the BMC. They advance the research of Täuscher & Laudien (2018) and other BM frameworks by including conditions for sustainability performance. One sustainability performance indicator of particular relevance to LoTs is the sourcing of goods. To counter potential rebound effects, Curtis & Mont (2020) propose sustainability performance indicators for sharing organizations, including leveraging an idling capacity of an existing stock of goods, rather than purchasing new. Ameli (2017) & Baden et al.'s (2020) research on LoTs indicate that many LoTs source their inventory through item donations, which presumably would represent used goods. However, one LoT in Baden et al.'s research sourced new goods.

Curtis (2021) enhances Curtis & Mont's (2020) tool with additional attributes based on his analysis of 63 sharing platforms (see Figure 2-3). He further categorizes sharing organizations into archetypes (e.g., community collaborative platforms), with dominant configurations for each archetype based on his framework. Of the sharing platforms analyzed in this paper, one tool library was included, but otherwise no LoTs were included. Further, Curits (2021) noted that goods-sharing BMs were more diverse. Thus, my research will contribute to the field by disaggregating this framework further for LoTs.

Attribute		Configuration Options															
Value Facilitation	Key Activity	Platform mediation allowing for access to under-utilised goods															
	Platform Type	Peer-to-Peer	Business-to-Business		Business-to-Peer		Crowd / Cooperative		Business-to-Consumer		Public-to-Citizen						
	Practice	Shared Space		Shared Mobility		Shared Goods		Shared Consumables		Shared Resources							
	Intellectual Property	Open Source				Communal				Proprietary							
	Governance Model	Cooperative				Collaborative				Corporate							
	Price Discovery	Free	Pay What You Can	Negotiation / Bargaining		Auction		Bartering		Set by Resource User		Set by Resource Owner		Set by Platform			
Value Delivery	Key Value Proposition	Reduction of transaction costs in sharing															
	Mediating Interface	Smartphone App		Website		Third-Party App or Integration				Other							
	Venue for Interaction	Offline		Hybrid		Online				None							
	Review System	Resource Owner Reviews		Resource User Reviews		Platform Reviews				None							
	Geographical Scale	Existing Community		Local		Regional		National		International		Nodes					
Value Capture	Value Orientation	Societal / Public				Social				Environmental				Commercial			
	Revenue Streams	None	Transaction Fee	Commission	Subscription Fee	Membership	Advertisements	Data Mining	Sponsorship	Donations	Public Project Funding	Private Project Funding	Fines or Fees	Lead Generation			
		Usage Rates	Convenience Fee	Promotions	Buy-Out	Credits, Tokens, or Digital Currency	Additional Services	Service Retainer	Verification	Franchise	Revenue Sharing	Ownership Share	Registration Fee				
	Pricing Mechanisms	None				Static Pricing				Dynamic Pricing				Differential Pricing			
	Price Discrimination	None		Feature-Based		Location-Based		Quantity-Based		User-Based		Access-Based		Market share-Based			
	Revenue Source	None		Volunteer		Other		Resource Owner		Resource User		3rd-Party					
	Sustainability Performance	Operates as a platform				Leverages idling capacity of an existing stock of goods				Possesses non-pecuniary motivation for ownership				Facilitates temporary access over ownership			

Figure 2-3 Sharing economy business model framework. From "Business model patterns in the sharing economy" by S.K. Curtis, 2021, Sustainable Production and Consumption, 27, p. 1657. CC-BY 4.0. <https://doi.org/10.1016/j.spc.2021.04.009>.

2.6.2 Municipal Governance Models

Municipal governments can play an important role in nurturing and protecting social enterprises, such as LoTs (Raggers & Schickner, 2017). Wasserbaur et al. (2022) conducted a systematic review of the interactions of government policies and BMs. They found that sharing is an important area of collaboration between businesses and municipalities, emphasizing that “cities are the most appropriate actors to create the specific conditions needed by local innovative BMs to spur CE activities” (Wasserbaur et al., 2022, p. 8).

While municipal governance is not traditionally included in BM analysis, it is quite relevant to LoT operations. It ties into the funding model and resourcing as many LoTs receive some form of support from the municipal government, such as full or partial financial funding and donation of space to host the LoT (Baden et al., 2020). On the other hand, LoTs may face challenges when municipal governance and strategy are not well-aligned. For instance, Raggers & Schickner (2017) interviewed municipal stakeholders supporting sharing organizations in southern Sweden. Interviewees raised challenges with municipal support of sharing organizations, such as conflicts with fair competition, potential taxation concerns, and conflicts between priorities across various municipal departments. These types of roadblocks are what the SEAP hopes to address, in advancing both the social and circular economies (European Commission & OECD, 2022). For instance, the policy brief identifies alignment of priorities across government policies, provision of appropriate financial support, and removal of regulatory barriers as key actions policymakers can take to advance the social and circular economies.

Voytenko Palgan et al. (2021) developed a framework for municipal governance of the sharing economy, presented in Figure 2-4. The framework includes an inner circle, representing municipal government mechanisms, and an outer circle, representing government roles when

engaging with sharing organizations. In these roles, governments can promote or hinder sharing organizations. While all parts of this framework are relevant to some extent, the provision (or withdrawal) mechanism and roles of investor, host, and owner were identified as most relevant to LoT BMs based on the literature review. The investor role provides funding, the host role provides infrastructural support (i.e., space for the LoT), and the owner role refers to the municipality owning and operating the sharing organization. These provisioning roles are related to Curtis' (2021) "public-to-citizen" marketplace type.



Figure 2-4 Analytical Framework of Municipal Governance of the Sharing Economy. Adapted from "Governing the sharing economy: Towards a comprehensive analytical framework of municipal governance," by Y. Voytenko Palgan, O. Mont, and S. Sulkakoski, 2021, *Cities*, 108, p. 9. CC-BY 4.0. <https://doi.org/10.1016/j.cities.2020.102994>.

2.7 Summary

In summary, LoTs sit at the intersection of the sharing and social economies. They can play an important role in accelerating the transition to circular practices and sustainable consumption, while ensuring that social benefits are also realized. BMs for goods-sharing are quite diverse and research dedicated to niche community goods-sharing platforms, including LoTs, is sparse, pointing to a need for additional knowledge in this area. Previous sharing economy business model research has often focused on the cases of AirBnB and Uber (Curtis, 2021). Curtis (2021) advanced this research by developing a sharing economy business model framework, based on previous business model research and empirical evidence from 63 sharing platforms. Of those platforms studied, one tool library was included, but otherwise no LoTs.

Ameli (2017) and Baden et al. (2020) studied LoTs specifically, with Ameli (2017) surveying all LoTs that existed at the time (58) and Baden et al. (2020) performing a case study of six LoTs in the UK. Their research indicates that many LoTs face challenges consistent with social enterprises. The "newness" of LoTs means that established best practices are lacking, as is academic research on the topic. Common BM challenges in the literature included securing sufficient and reliable funding, managing limited volunteer time, sourcing appropriate inventory,

and finding a suitable space, all while keeping borrowing costs sufficiently low. Thus, research is needed to better understand these gaps and to identify solutions. In addition, research is needed to update the current state of LoT BMs compared to Ameli's research in 2017, and to cover a broader geographical scope than Baden et al.'s (2020) research on UK-based LoTs. Thus, the literature review has confirmed that the following research questions are relevant for further study:

RQ1: What business model configurations are libraries of things using today?

RQ2: What are the dominant archetypes of libraries of things?

2.7.1 Proposed Analytical Framework

To answer the research questions above, I developed an analytical framework depicted in Figure 2-5. This framework uses Curtis' (2021) sharing economy business model framework as a starting point. I have modified it to disaggregate certain attributes and configuration models that are specific to social enterprises and LoTs, using elements from Baden et al. (2020), Ameli (2017), the Social Lean Canvas (Moskovitz, 2020), Petrescu et al. (2021), and Ozanne et al. (2019). I have also incorporated components of Voytenko Palgan et al.'s (2021) municipal governance model into my framework, as municipal governance may help or hinder LoTs. From each of these frameworks, I have taken the elements that are most relevant for LoTs based on the literature review, while some configurations were removed. The four major updates are discussed below.

First, I updated to remove or update terminology that was specific to platforms and multi-sided markets. Curtis' (2021) framework and the related research it built on (Curtis & Mont, 2020; Täuscher & Laudien, 2018) focus on platform-based BMs in a multi-sided marketplace. LoTs operate as a one-sided market, where the organization creates value rather than facilitating value between individuals in a multi-sided market context. Curtis & Mont (2020) included operating as a platform as a sustainability performance condition to enhance the social dimension of sharing; however, the literature indicates that LoTs already have strong social values, thus this condition was removed. **Second**, the framework was updated to include BM aspects that are of particular importance for LoTs and social enterprises compared to sharing organizations generally, including inventory categories and size, opening hours, staffing and use of volunteers, and the membership model (Ameli, 2017; Baden et al., 2020). **Third**, the funding model was updated to further disaggregate the source and type of funding. Sources include private organizations, the municipal government, and individuals. The type of support provided includes inventory, space, and monetary funding (Ameli, 2017; Baden et al., 2020; European Commission & OECD, 2022; Voytenko Palgan et al., 2021). The funding model overlaps with some of the options included in the revenue source attribute (e.g., municipality is a potential revenue source and is also part of the funding model). This was included because in some cases, supporters may be listed on the LoTs website, but without explanation of what they funded. For example, it may be possible to see that the municipality is a supporter, but not whether they provide space, funding, or both. **Lastly**, impact reporting was added to capture the non-economic value generated by LoTs. The impact reporting categories were based on Petrescu et al. (2021) and Ozanne et al. (2019), including the metrics most relevant for LoTs based on the other literature reviewed.

	Attribute	Configuration Option					
Value Creation	Key Activity	Providing access to under-utilized goods on a short-term basis					
	Marketplace Type	Business-to-Consumer			Public-to-Citizen		
	Practice	Shared Goods			Shared Consumables		
	Governance Model	Cooperative		Collaborative		Corporate	
	Legal Form	[Varies - Qualitative Text]					
	Price Discovery	Free	Pay what you can		Bartering	Set by LoT	
	Inventory: Categories	[Varies - Qualitative Text]					
	Inventory Count	[Varies - Numerical Value]					
Value Delivery	Key Value Proposition	Reduction of transaction costs in sharing					
	Mediating Interface	Smartphone App		Website		3rd Party App or Integration	
	Venue for Interaction	Offline		Hybrid		Online	
	Opening Hours	Days per Week			Hours per Day		
	Review System	Resource User Reviews			LoT-Level Reviews		
	Geographical Scale	Existing Community	Local	Regional	National	Nodes	
	Staffing	Volunteers			Paid Staff		
Value Capture	Value Orientation	Societal		Social		Environmental	
	Funding Model - Private	Financial funding		Provision of space		Inventory donations	
	Funding Model - Municipal	Financial funding			Provision of space		
	Funding Model - Individual	Financial donations		Inventory donations: permanent		Inventory donations: temporary	
	Revenue Streams	Transaction Fee	Membership	Advertisements	Sponsorship	Franchise Fees	Fines or Fees
		Usage Rates	Convenience Fee	Promotions	Additional services	Service retainer	
	Pricing Mechanisms	None		Static Pricing		Differential Pricing	
	Price Discrimination	None		Feature-based	Quantity-based	User-based	
	Revenue Source	None	Crowdfunding	Resource User	Municipality	Funding Body	
	Membership Model	[Varies - Free Text]					
	Sustainability Performance	Possesses non-pecuniary motivation for ownership			Leverages idling capacity of an existing stock of goods		
	Impact Reporting	None	Volunteer hours	Donations Received	Members' Financial Savings	Items Repaired	

Figure 2-5 Proposed LoT Business Model Framework. Own elaboration based on literature review (Baden et al., 2020; Curtis, 2021; Moskovitz, 2020; Ozanne et al., 2019; Petrescu et al., 2021; Voytenko Palgan et al., 2021).

3 Methodology

3.1 Research Design

A qualitative research design was used to address the aim and research questions identified. This research aims to improve the current understanding of LoT BMs in order to support their design and implementation. The research design uses both literature and empirical data to describe and analyze existing LoT BMs and to derive dominant archetypes. Figure 3-1 presents an overview of the research design.

To identify the BM configurations, I first proposed a framework based on the literature review and background interviews (*phase 1*). This framework was then tested and refined by mapping the 90 LoTs identified against it by reviewing publicly available documentation (*phase 2*). To supplement the document review, targeted personal communications with LoT practitioners were used to fill in gaps in understanding and to triangulate findings against themes from the literature. Based on the data collected, the framework was refined and presented along with descriptive findings for each component. The mappings were then qualitatively analyzed for patterns to develop LoT archetypes (*phase 3*).

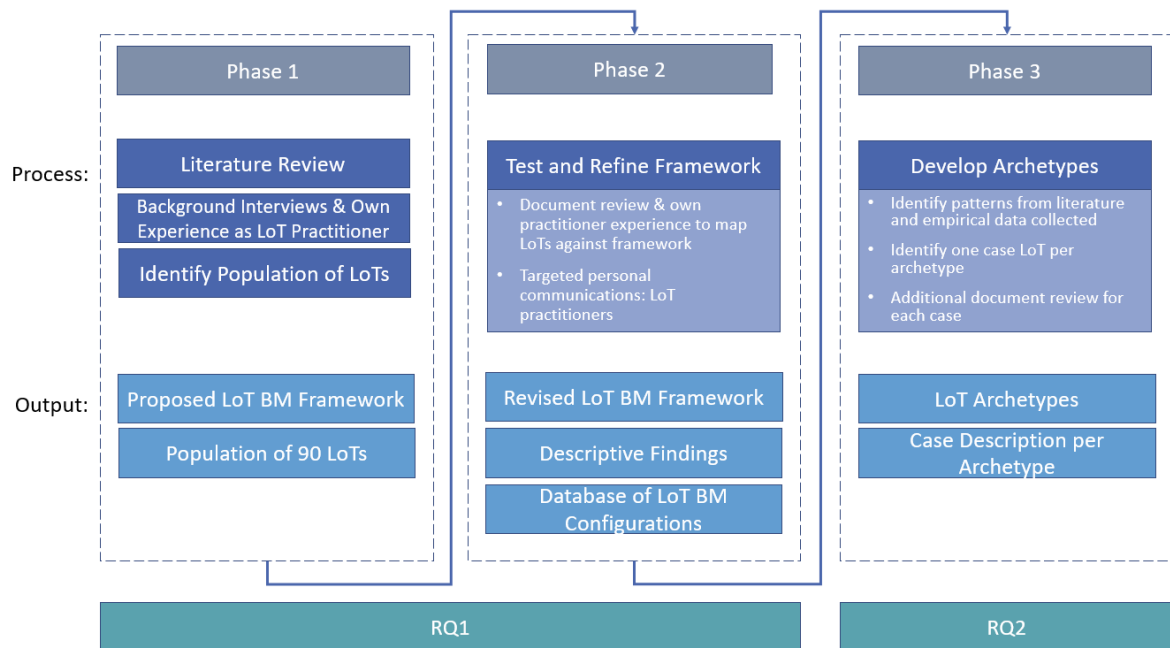


Figure 3-1 Research Design. Own elaboration.

3.2 Data Collection

3.2.1 Phase 1: Background

Literature Review

The literature review (Section 2) includes academic and grey literature sources related to the sharing economy, social economy, and LoTs. I started by performing a Scopus search of “library of things” and scanned titles and abstracts for relevant papers, which identified two relevant sources. Additional papers were identified through recommendations by academic experts and through snowballing (i.e., identifying additional papers through the reference lists of the originally selected papers). The additional papers covered social enterprises and sharing

economy literature, with a focus on BMs, financial viability, value generation, and sustainability of these organizations. The literature review included sources that covered a variety of geographic contexts and emerged primarily from the disciplines of business management, economics, and policy, though several were interdisciplinary in nature. The sources were limited to papers available in English.

Background Interviews

The literature review was supplemented by two background interviews with LoT practitioners (see Appendix B). The interviews were conducted in a semi-structured format via video conference, with a goal of gaining practitioner perspectives on the current landscape and population of LoTs, as well as challenges related to BMs and financial viability. Notes were taken electronically during the interviews. These interviews informed and validated the proposed analytical framework developed based on the literature review (Section 2.7.1).

Identifying the Population of LoTs

Phase 1 involved compiling the population of all known LoTs as of February 2022 through desktop research and background interviews. The LoTs were identified through an internet search of “library of things” and similar terms, as well as from lists suggested during background interviews. Examples of sources consulted to compile the list include MyTurn’s Directory², Wikipedia³, a listing of German-speaking LoTs⁴, and a Facebook forum for LoT administrators⁵. This listing only includes LoTs (i.e., libraries with a diverse range of goods), while excluding specialty libraries, such as tool or toy libraries.

I identified 90 LoTs in total, which can be found in Appendix A. The geographical spread includes 56 in Europe, 31 in North America, and 3 in Australia. In cases where there are multiple locations for a given LoT (e.g., Fritidsbanken (Sweden) or Library of Things Ltd. (London, UK)), those were counted as one LoT each, not one LoT per site. While compiling this list, other descriptive information, including year opened, city, state or province, and country were also collected. It is possible LoTs were missed when compiling this population, though the large sample size minimizes the risk that BM configurations and archetypes would be completely missed.

3.2.2 Phase 2: Test and Refine Framework

Document Review

I chose to collect data for the 90 LoTs identified through secondary sources, consistent with previous empirical research on BMs (Curtis, 2021; Täuscher & Laudien, 2018). LoT BMs, as well as the related platform, sharing, and LoT BMs that informed the proposed framework (Section 2.7.1), are quite recent. Knowledge of the underlying definitions used in the framework is required to collect consistent data, making other methods such as surveys less desirable. Document review also carries the benefits of capturing the language used by participants, allowing the researcher to capture data for a high number of organizations in an unobtrusive manner, and allowing the researcher to see which evidence the organization has given more attention (Creswell & Creswell, 2018). Disadvantages include incomplete materials, potential

² https://localtools.org/find/#map_top

³ https://en.wikipedia.org/wiki/Library_of_Things#List_of_organizations

⁴ <https://leihladen-vernetzung.de/liste/>

⁵ <https://www.facebook.com/groups/2264099010336961>

inaccuracies in the data, and time required to search for information in at times hard-to-find places (Creswell & Creswell, 2018).

Publicly available documentation was used, including the LoT's website, social media, reports, videos, and articles. The data was collected between January and March 2022. It was based on the BM in use as of these dates and any future BM plans announced as of these dates. For documentation published in languages other than English, text was translated using Google Translate; however, documentation presented in non-HTML text format (e.g., graphics, videos, or PDFs) could not be readily translated and were thus excluded in most cases. In some cases, the level of detail available on LoT websites was limited. If information was missing, a cursory internet search was performed to attempt to find the missing data.

Own Practitioner Experience

My experience as the Technology and Finance Officer at Circle Centre, an LoT in Sweden, has also informed my research. My experience with implementing and maintaining technology for LoTs, including lending systems, informed what secondary data would likely be available for LoTs. This helped inform the proposed analytical framework in Section 2.7.1 and informed the research design. My experience also allowed me to map Circle Centre against the framework using first-hand knowledge that was not available via secondary sources.

Targeted Personal Communications

I used targeted personal communications with LoT practitioners, including emails and short semi-structured interviews to collect additional data. These were used to understand motivations for unique or uncommon configurations, and to triangulate data against the literature. The communications were centered around specific BM attributes: impact reporting, temporary inventory donations, and B2C vs. public-to-citizen marketplace type (see Appendix B). The respondents were contacted via email with an overview of the research project, the topic of interest, and some questions on the relevant attribute. Questions sought to understand the LoT's motivation for using the relevant BM attribute and to understand how it was working for the LoT in practice. Respondents could choose to either respond via email or to participate in an interview. Two responded via email and three participated in interviews. The interviews were conducted in a semi-structured format with targeted questions on the relevant BM attribute. In some cases, other topics emerged during the interviews. Notes were taken electronically and any unstructured data from other topics was coded against the framework (Section 2.7.1).

3.2.3 Phase 3: Develop Archetypes

Phase 3 involved developing archetypes for dominant configurations of LoT BMs. This phase relies on the same data collected in phase 2. For each archetype identified, one case LoT was selected as an example to illustrate the BM in detail. For each case, I conducted additional document review to gather sufficient data to describe the LoT's BM in detail.

3.3 Data Analysis

3.3.1 Phase 1: Background

In phase 1, I synthesized the literature by performing a content analysis using NVivo. I imported the papers selected to NVivo and coded abductively, starting with a set of expected codes and then performing open coding as I continued reading. Similarly, background interviews were coded abductively. The synthesis of the literature resulted in the proposed framework presented in Section 2.7.1. The background interviews informed and validated the proposed framework.

3.3.2 Phase 2: Test and Refine Framework

Phase 2 consisted of testing and refining the proposed framework in Section 2.7.1. First, I performed a content analysis using binary coding and qualitative text. New configuration options were added abductively as they emerged through review of LoT documentation and targeted personal communications. There are three outputs from this analysis: 1) a database of BM configurations for the 90 LoTs reviewed, 2) a refined framework (Section 4.1), and 3) descriptive findings and examples for each BM configuration (Sections 4.2 to 4.4).

Each LoT was mapped against the proposed framework (Section 2.7.1) in an Excel synthesis matrix⁶. Most variables were mapped using binary coding, with “1” indicating that the attribute was observed in the BM and “0” indicating it was not (Curtis, 2021; Täuscher & Laudien, 2018). A “0” simply indicates that the attribute was not observed in the documentation. It is possible the attribute does indeed exist in the LoT’s BM but was not discernable from the documentation. For each attribute, several configurations are possible. For example, most LoTs will use several revenue streams.

Qualitative text was also captured according to the framework. This was captured in three cases: 1) if the attribute was not conducive to binary coding, 2) to capture additional context for a configuration option, and 3) to capture unstructured data. In the first case, some attributes could not be coded in a binary format. For example, data points on opening hours (e.g., days the LoT is open and opening hours per day) and certain inventory data points (e.g., inventory categories and total number of items in the inventory) were captured in text or numerical format, as applicable. If data was missing in these cases, the field was left blank. In the second case, Excel comments were used to paraphrase or capture direct quotes about particular LoT configuration, where relevant. This was to aid in the findings section when describing the attributes used in practice by LoTs. For instance, some LoTs indicated that they were fine-free and included the rationale of the policy. This was captured in a comment in the relevant cell for the LoT and configuration of “fines or fees.” In the third case, data that seemed interesting or relevant but was not captured in the framework was captured as unstructured data in an “other notes” column of the spreadsheet.

In both cases (i.e., binary coding and qualitative text), data was coded abductively. Abductive coding starts with codes based on theory and adds codes that emerge through the researcher’s observations (Tavory & Timmermans, 2014). The framework in Section 2.7.1 was used as a starting point, but additional configuration options were added abductively based on document review, resulting in the final framework presented in section 4.1. For configurations added abductively, LoTs would be checked for these configurations going forward, but previously reviewed LoTs were not re-examined for these.

3.3.3 Phase 3: Develop Archetypes

In phase 3, I analyzed the database of BM configurations from the previous phase to identify patterns and develop LoT archetypes. BM archetypes can be determined qualitatively or quantitatively. Some researchers have used quantitative cluster analysis to derive archetypes (Curtis, 2021; Täuscher & Laudien, 2018). Täuscher & Laudien (2018) describe the aim of cluster analysis as “discovering distribution patterns and identifying interesting correlations among data attributes” (p. 322). On the other hand, Bocken et al. (2014) developed archetypes qualitatively, though using logic that is similar to cluster analysis. Bocken et al. (2014) formulate

⁶ The empirical database can be accessed here: <https://1drv.ms/x/s!AnkQ-ESFFjZwgTafeWaBR9wWFL8H?e=z1kwbs> or by contacting the author at emily.mize@gmail.com.

archetypes based on important themes from the literature (i.e., theory) and themes that emerged through empirical data.

I decided to use qualitative analysis to determine the archetypes for two reasons. First, grouping archetypes around themes from the literature creates meaningful archetypes grounded in theory. Second, quantitative cluster analysis was not considered to be feasible within a thesis timeline, as I do not have experience with this technique. Learning cluster analysis, coupled with the time-consuming nature of document review in phase 1 would not have been feasible for this research.

Thus, in this thesis archetypes were qualitatively formulated with guiding principles of being “clear and intuitive, mutually exclusive and explanatory, but not overly prescriptive” (Bocken et al., 2014, p. 45). The themes from the literature and empirical data were compared across the database for similarities and differences, to develop archetypes (Corbin & Strauss, 1990). The important themes from the literature included **inventory management, venue for interaction, staffing, membership model, and funding models**. Through the empirical data collected, **marketplace type, governance model, value orientation, and geographical scale** also emerged as important themes, where variation was observed. Once the archetypes were determined, I coded additional documentation for each example LoTs against the revised framework to provide a case description of each archetype.

4 Findings and Analysis

This section presents findings and analysis of the data collected on 90 LoT's. **RQ1** is answered in Sections 4.1 to 4.4. Section 4.1 presents the revised LoT BM framework with an explanation of key differences from the proposed framework presented in Section 2.7.1. The revised framework is centered around value creation, value delivery, and value capture. The detailed components of each value type will be discussed in Sections 4.2 to 4.4. Section 4.5 presents the four LoT archetypes derived from the data analysis (**RQ2**). For each archetype, a case LoT was selected to illustrate an example of the archetype in practice.

4.1 Library of Things Business Model Framework

One of the main outputs of this research design was a revised LoT business model framework. The proposed framework (Section 2.7.1) was iteratively tested and revised based on empirical data collected to arrive at the final framework. The findings in this section are supported by an empirical database of the business model configurations for 90 LoT's.⁷ Through this process, the format of the framework was changed from the morphological box format used in the proposed framework. The rationale for this will be discussed in Section 5.1. Instead, the final framework is presented as the high-level framework in Figure 4-1, which is then expanded into sub-frameworks as each component is discussed in Sections 4.2 to 4.4. The final framework is broken down and presented in this way, as it is too large to easily conceptualize in one figure.

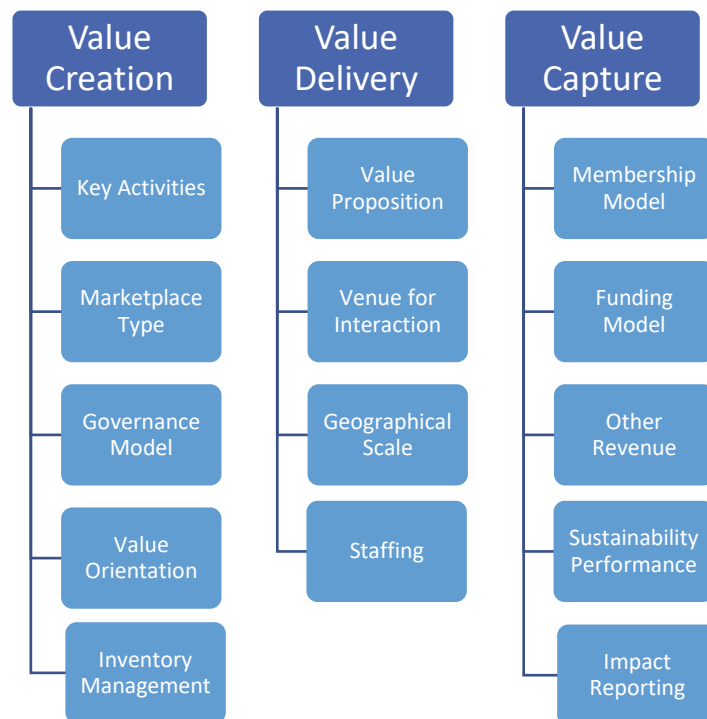


Figure 4-1 Library of Things Business Model Framework

⁷ The empirical database can be accessed here: <https://1drv.ms/x/s!AnkQ-ESFFjZwgTafeWaBR9wWFL8H?e=z1kwBS> or by contacting the author at emily.mize@gmail.com.

4.2 Value Creation

The following sections will discuss the framework for LoT value creation, including key activities, marketplace types, governance models, value orientation, inventory management, and sustainability performance.

4.2.1 Key Activities

The final framework combines **key activities** and **practice** under one heading, since all observed key activities for LoTs can be captured as sharing practices. Sharing goods and sharing consumables were both included in the proposed framework and observed in practice. A new activity was added for sharing knowledge and skills, as displayed in Figure 4-2.

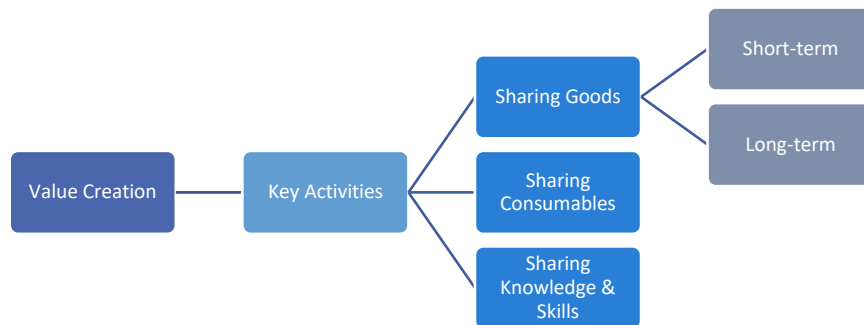


Figure 4-2 Key Activities

The **sharing of goods** is inherent in the definition of an LoT and was thus observed for all LoTs. It should be noted that when describing goods-sharing, LoTs tend to use the term “borrow” instead of “rent,” with one LoT explaining: “Although it is factually the same, we make a point of not saying ‘rent’ but ‘borrow’. For us, renting has a profit-oriented tone. But we are not profit-oriented, so you can only borrow from us” (Leihlager, n.d.).

Sharing Goods was further disaggregated into **short-term access to underutilized goods** and **long-term access to household goods** based on observation. **Short-term** borrowings were typically offered by days or weeks, with most LoTs loaning items for one to two weeks at a time. A new configuration option was added for providing access to household goods used on a **long-term** basis (up to one year). One LoT, Circle Centre (Lund, Sweden), provides access to both short-term and long-term goods. Their long-term inventory includes household items, such as bedding, towels, kitchen supplies, Wi-Fi routers, and yoga mats. Based on my personal experience working with Circle Centre, I can share that the motivation for loaning long-term items relates to the LoT’s location near Lund University. Many students move to Lund for either an exchange semester or a program of just a few years. Thus, Circle Centre provides an alternative in the form of loaning household items rather than purchasing them when students arrive.

To complement sharing goods, nine LoTs (10%) also **shared consumables**. For instance, this may include sharing blades for certain tools or buttons for button-makers. Others require users to provide consumables for the equipment they borrow.

Many libraries **shared knowledge and skills**. A representative of Leila-Bologna (Italy) described this as a guiding principle when establishing an LoT: whether the LoT is conceptualized as a lending service or as a cultural activity [R3]. Leila-Bologna (Italy) views sharing as a cultural activity that builds trust and community. R3 discussed lending a drill as an example. The LoT does not simply provide the user with the drill, they also share knowledge

about how to use it. Thus, some LoTs may consider sharing knowledge and skills to be the primary activity before goods-sharing. This conceptualization is closely linked to the value orientation (Section 4.2.4).

Among knowledge and skills shared, repair skills were frequently shared, for instance through Repair Cafés (e.g., Share Oxford (UK)), bike maintenance workshops (e.g., Share Bristol (UK)), makerspace offerings (e.g., Keen Public Library (New Hampshire, US)), or clothes mending workshops (e.g., Circle Centre (Lund, Sweden)). Many LoTs housed makerspaces and/or operated or partnered with local repair cafés to offer repair workshops. These events can be a good fit for libraries that already stock tools in their inventory. Repair events can bring together community members to share knowledge and repair skills, empowering individuals to repair their own items. Partnering with repair cafés can also facilitate maintenance and repair of the LoT’s own inventory.

LoTs may also offer other programming for sharing knowledge and skills in line with their value orientation (social, environmental, and/or societal change). For instance, Leila Berlin (Germany) has offered zero waste workshops and seed swaps (Leila Berlin, n.d.-d). Circle Centre (Lund, Sweden) has offered a clothes swap, repair and mending workshops, and a panel on circular economy and degrowth (Circle Centre, n.d.).

Some LoTs also engaged in space sharing and mobility-sharing (e.g., lending bikes), though these were not primary activities of the LoT. Thus, these were not added to the framework.

4.2.2 Marketplace Type

Of the LoTs reviewed, 60 operated via a **B2C** format, while 30 operated as **public-to-citizen** (Figure 4-3, Figure 4-4). Note that “business” in B2C is interpreted with a broad understanding of what constitutes a business, including non-profits, as discussed in section 2.6.1.

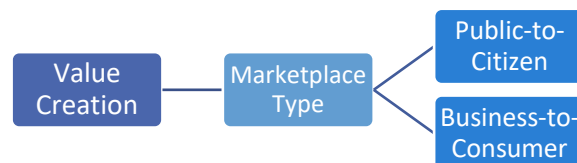


Figure 4-3 Marketplace Type

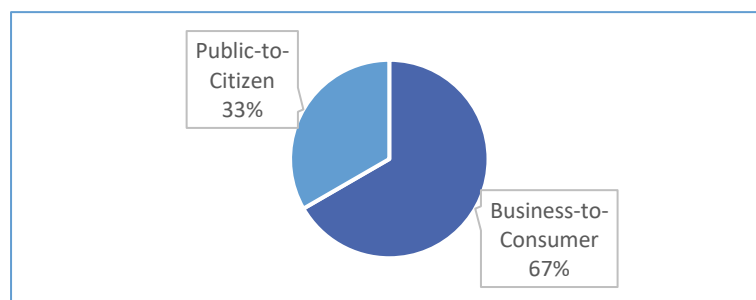


Figure 4-4 Marketplace Type of LoTs Reviewed

For **B2C**, the **legal form** of LoTs were often non-profit entities or projects of another non-profit. Rules governing non-profits vary by jurisdiction, but some may allow individuals to claim tax deductions for donations to non-profits, potentially incentivizing donations. German LoTs commonly mentioned that they could provide a donation receipt (e.g., Heinerleih (n.d.)).

In the UK, several LoTs highlighted on their websites that a distinguishing feature of LoTs compared to rental shops is the legal form. They note that LoTs are organized as non-profits or community-interest companies (CICs), rather than for-profit companies. Over half of UK LoTs were organized as community interest companies (CIC), which is one of the legal forms of social enterprises in the UK. It has certain requirements, including an “asset lock” that restricts use of company assets to social objectives (*Setting up a Social Enterprise*, n.d.). Library of Things Ltd. (London, UK) was organized as a private company limited by shares, rather than as a charity (Library of Things Ltd., 2019). This was mainly motivated by funding restrictions as a charity, which will be discussed further in section 4.4.2.

The LoTs operating in **public-to-citizen** format were overwhelmingly located in the U.S. All LoTs in the U.S. (28) operated as part of traditional libraries (i.e., those lending books). There was a particularly high number of LoTs in the state of Massachusetts. Otherwise, Banff Public Library (Canada) and Bibliothèque de Bagnes (Switzerland) operate LoTs in addition to the standard library offerings. It should be noted that the legal form of traditional libraries can vary. In the U.S. context, libraries can be either fully run by the government (i.e., municipality as the “owner” per Voytenko Palgan et al. (2021)), or the library can take the form of a non-profit organization [R6] that also receives dedicated funding from government (i.e., municipality as “host” and/or “investor” per Voytenko Palgan et al. (2021)). For example, Curtis Memorial Library (CML) (Maine, US) is organized as a non-profit, with the local government providing the building to host the library and funds for staff salaries, but the items offered for loan (both books and “things”) are purchased with funds raised by the non-profit [R6]. In this case, the municipality is a host and an investor, but not an owner per Voytenko Palgan et al. (2021). Thus, while the legal form of traditional libraries may differ, for purposes of this research, they are grouped together as “public-to-citizen” due to the similar service offering and the nature of government support.

Since reliable funding can be a challenge for social enterprises such as LoTs, one may question whether LoTs should be organized on a public or private basis. The public-to-citizen format can provide benefits such as provision of space, funding, and paid staff, which may address some of the social enterprise challenges presented in the literature review (Section 2). R6 of CML offers a unique perspective of each platform type, since she has experience running an LoT from a traditional library (i.e., public-to-citizen), as well as co-founding a B2C, volunteer-run tool library in the past. Based on her experience, she identified a few potential reasons one might organize as B2C rather than public-to-citizen. First, for those interested in starting an LoT, it will depend on whether their local library is receptive to the idea of an LoT. She noted that at the time the founders of the B2C tool library were planning in 2012, lending of “things” was not a priority for the local public library. Though, she acknowledged that trends are changing and that may no longer be the case if the local library were approached today. Second, she noted that in the U.S. context, a specific degree is required to become a librarian. The American Library Association states that “a master's degree in library science ... is necessary for most librarian positions in most public, academic, and special libraries” (American Library Association, 2016). Thus, starting an LoT by seeking employment at a traditional library would not be a viable route unless the individual has the required degree. Lastly, she noted expediency as a motivating factor. If you have a motivated group of community members willing to run the LoT on a volunteer-basis, it can simply be faster to open independently in a B2C format.

4.2.3 Governance Model

The final framework displays governance model along a spectrum of member involvement, with the “cooperative” model representing more member involvement and “formal” representing less (Figure 4-5). Note that the term “corporate” was updated to “formal” in the final

framework. This was changed because “corporate” has a profit-oriented tone and could imply a legal form (i.e., corporation), which is not the intent here.

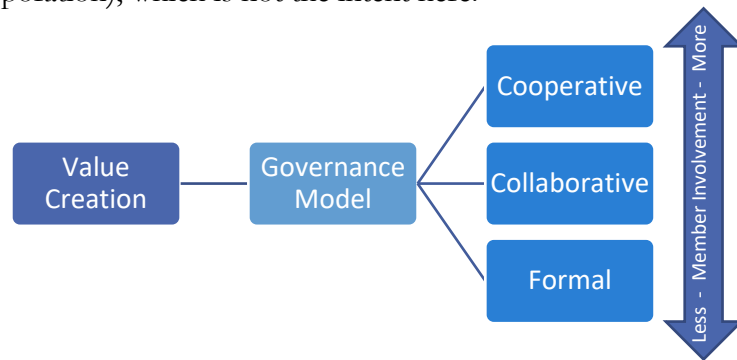


Figure 4-5 Governance Model

When analyzing data, the line between collaborative and formal was particularly difficult to discern, as nearly all LoTs involve volunteers and solicit feedback in some capacity. Thus, I propose displaying this as a spectrum rather than as three distinct models. Since most LoTs did not explicitly describe themselves with such terms, a judgment was made based on the language used on the website (examples in Table 4-1).

Governance Model	LoT Example	Description
Cooperative	La Manivelle Lausanne (Switzerland)	Employs horizontal governance, where volunteers have the same decision-making weight as others in the organization (La Manivelle Lausanne, n.d.).
Collaborative	Luula (Germany)	While members are "cordially invited" to participate in the LoT's operations, there is no obligation to come to meetings or work in the LoT. The membership is designed to be free, both monetarily and from work obligations (LUULA, n.d.).
Formal	Library of Things Ltd. (London, UK)	Employs a more formal structure with a team of paid employees, "mission guardians," and advisors. (Library of Things Ltd., n.d.).

Table 4-1 Examples of Governance Models from LoTs Reviewed

4.2.4 Value Orientation

Value orientation describes the guiding values behind the LoT’s mission. While these can overlap with the value proposition (section 4.3.1), there can be differences between the LoT’s value orientation and the value proposition for users. For example, one LoT founder noted that the LoT’s main value orientation was environmental, while member survey responses indicated that this was less important for its members [R1].

Overall, most LoTs were explicit about their mission and values on their websites. The most-mentioned value orientation was **social** (58), followed by **environmental** (54), then **societal** (33). Twenty-two of the 90 libraries identified with all three value orientations. For 12 LoTs, the value orientation was not discernable based on the information shared on their sites.

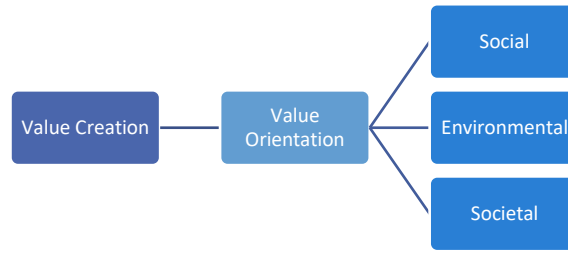


Figure 4-6 Value Orientation

The **societal** value orientation challenges dominant norms and consumption patterns, often aligning with concepts such as the sharing economy, sufficiency, and/or commoning. The **environmental** value orientation is motivated by reducing resource use, emissions, and waste generated. The **social** value orientation often indicated values such as social inclusion, building community, and sharing knowledge (Sections 4.2.1 and 4.3.1). Traditional libraries often explained the LoT concept as an extension of their mission statements to support lifelong learning and cultural exchange opportunities. For example, Cary Library (Massachusetts, US) states that its LoT complements the overall library’s mission “to ignite curiosity, facilitate lifelong learning, and connect our community” (Cary Library, n.d.).

Several LoTs specifically emphasized that they do not have a **commercial** value orientation. In the UK several LoTs explain the difference from rental shops on their website. Differences include their legal form (non-profit or CIC, see Section 4.2.2), their free or low loan fees to provide accessibility for all (social value orientation), and because they see themselves as part of a wider movement changing economic behaviors and reducing waste (societal and environmental value orientation). Similarly, Leihlager (Basel, Switzerland) explains that they deliberately use the term “borrow” instead of “rent” because they feel that “rent” has a profit-oriented tone (Leihlager, n.d.). R1 similarly explained the preference for the term “borrow” by stating: “we think of ourselves more like a traditional book library, though our service is not covered by Local Council Tax. This is where the term ‘Borrow’ fits rather than ‘Hire.’”

4.2.5 Inventory Management

Inventory management encompasses decisions related to what and how to source inventory (inventory content and inventory sourcing, respectively) and how to handle lost or damaged items. Inventory management BM components are depicted in Figure 4-7.

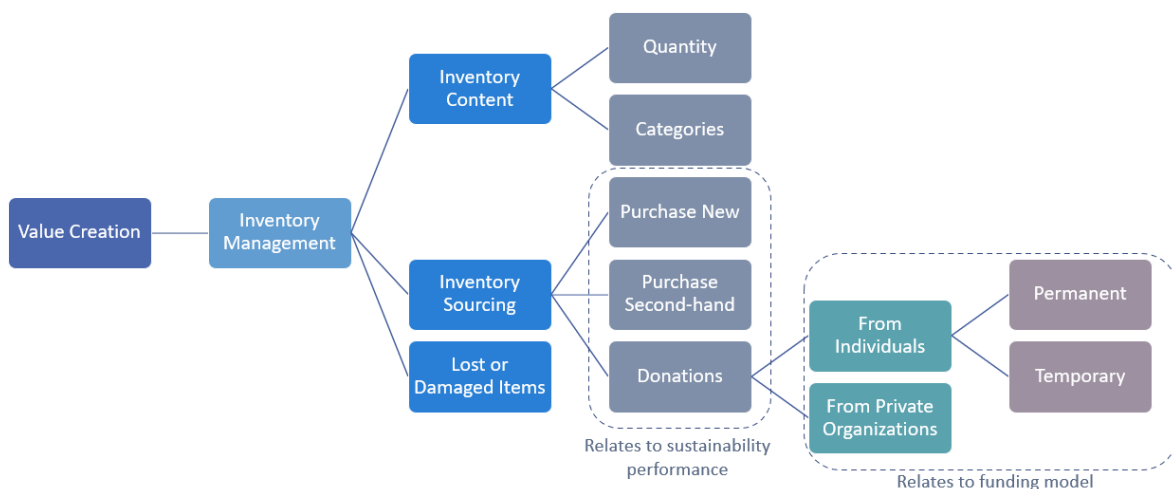


Figure 4-7 Inventory Management

Inventory Content

The size of LoT inventories varied widely, with some LoT **inventory quantities** in the single digits and others in the thousands. Though, several LoTs highlighted that a distinguishing feature of LoTs compared to hire shops is that they offer a much wider range of “things.” The types of items LoTs have may be the result of the donations they received, what the community has requested the LoT provide, and/or what can be linked to existing programming (e.g., in the case of traditional libraries). Some libraries may also restrict what types of items they carry to avoid competition with local businesses. For instance, Banff Public Library (Canada) states that they do not provide items that can be accessed through local rental stores, such as bikes, camping equipment, snowshoes, and ski gear (Banff Public Library, n.d.). R6 also shared a similar comment about CML (Maine, US), noting that it seeks to fill a niche of lending items that cannot be found in rental shops. Figure 4-8 presents a word cloud of the most frequently used terms in LoTs’ **inventory categories**, based on the data collected.



Figure 4-8 Word Cloud of Inventory Category Terms

Two LoTs took a unique approach to handling the category of tools. Rather than including tools in their own inventory, they outsourced this category to a separate tool library in the area. The Denver Public Library (Colorado, US) loans 2-week passes to the Denver Tool Library. These appear to be quite popular – there was a waitlist of 118 people for these passes as of March 4, 2022 (Denver Public Library, n.d.). Similarly, the Stuffbrary at Mesa Public Library (Arizona, US) outsources tool-lending to a separate government program (Mesa Public Library, n.d.).

Inventory Sourcing

LoTs primarily sourced their inventory through **donations** or by **purchasing items new or second-hand**. Donations of used goods or purchase of second-hand goods would be in line with the sustainability performance criteria of leveraging the idling capacity of *existing* goods (Section 4.4.4).

Some libraries may guide inventory sourcing through a more formalized strategy. CML (Maine, US) has a robust criteria document to determine whether an item will be a good fit for their library (Curtis Memorial Library, n.d.-d). For all items (donated or purchased), they consider whether the item is in working condition, whether there is community interest in the item, where it falls in their rank choice voting matrix, whether it aligns with a SDG, whether it aligns with planned library programming, whether it is an appropriate size for storage and transport, and

the level of maintenance and consumables it requires. For items that they purchase new, they use guidance such as acquiring the item from certain suppliers (local business, cooperative, B corporation, non-profit, and/or fair-trade supplier), considering where the item was made, whether the library can afford it, what end-of-life disposal options exist, and whether the item contains any harmful materials. Lastly, they consider whether the item will be used by community groups addressing a sustainability challenge.

In a presentation to other librarians about the LoT concept, CML indicated that many items the library stocks may be items used infrequently on an individual basis and in the \$200-300 (€180-270) range (Curtis Memorial Library, 2021). On a similar note, R1 shared that Library of Stuff CIC (Hull, UK) aims to stock items that cost around £30 (€36) or more to purchase and would be used infrequently on an individual basis. In this way, these items may be impractical or inaccessible for members to purchase on their own and are a good candidate for lending. R1 also noted that items costing less than this can be impractical for the LoT as the loan fees would be set quite low and would nearly be erased by credit card processing fees.

Inventory Donations: Individuals

Most LoTs accepted donations from individuals in some capacity. LoTs often published wish lists of items for donations, and some would only accept items from these lists. In some cases, LoTs posted requirements for type or quality of items, such as requirements that items are in clean, working condition with all spare parts, and must be easy to carry. Petrol-powered tools were often prohibited for safety reasons. Some LoTs, such as Leila-Bologna (Italy) encourage high quality donations through messaging such as: "the quality of the objects you want to find in libraries is directly proportional to the quality of the objects you decide to share" (Leila-Bologna, n.d.). The default donation method observed in the population reviewed was a **permanent donation** where ownership of the item transfers to the LoT; however, five LoTs also allowed **temporary donations**, where the donor retained ultimate ownership of the item and could take it back.

Two LoTs that accept both permanent and temporary inventory donations options are Heinerleih (Darmstadt, Germany) and Leihbar Bonn (Germany). Heinerleih allows temporary donations as an option to reduce hesitancy to donate items that may not be easy to part with [R4]. Only 5% of donors have provided items on a temporary basis, with the rest providing them permanently. Of those that have loaned on a temporary basis, none have taken their item back so far. Similarly, Leihbar Bonn allows temporary donations as well. The idea came from a member that wanted to share an expensive camera, but only on a temporary basis [R5]. They decided to allow temporary donations such as this and manage these through a contract with the donors. They note that managing the temporary loan process is not too big of an effort but does require extra time and impacts the work of volunteers in the LoT. They estimate that 10-20% of donations are temporary in nature. Overall, they shared that their experience with temporary donations has been positive.

By contrast, Leila-Bologna (Italy) does not accept outright inventory donations [R3]. They exclusively source their inventory through temporary donations as part of their membership requirement. To become a member, individuals must share an item for the period of their membership. Members retain ultimate ownership of the item and can take the item back if they do not wish to renew their membership. Per discussion with Leila-Bologna (Italy), it sees itself as providing a cultural activity rather than simply a service loaning objects. Their idea is that to become a member of the LoT, you need to share an item yourself, thus building trust and a sense of community. While in some cases, members may take the item back when their membership ends, more often, they leave the item with the LoT permanently.

Inventory Donations: Private Organizations

Some libraries partnered with other organizations to obtain inventory. LoTs may encourage companies to donate through sponsorship (e.g., Leihothek (Münster, Germany)), by offering increased exposure to the goods (e.g., Knjižnica REČI (Ljubljana, Slovenia)), or by providing companies with information such as usage statistics (e.g., Library of Things Ltd. (London, UK)). On the other end of the spectrum, some LoTs (e.g., Fritidsbanken (Sweden) and CML (Maine, US)) will only accept donations that are outright gifts and will not promote the donor in any way on their website or other channels. Some private or governmental associations may provide inventory or monetary donations for specific inventory purchases that are in line with their mission (e.g., blood pressure cuffs from the Mayo Clinic or a chimney sweep kit from the local fire department).

Table 4-2 provides examples of LoTs that received inventory donations from organizations. It is worth noting that Library of Things Ltd. (London, UK) was the only LoT that exclusively sourced its inventory through partner companies. The other LoTs in Table 4-2 received some inventory from these organizations, but otherwise sourced their inventory elsewhere (i.e., individual donations or purchase second-hand or new).

LoT	Location	Inventory Donated by Organizations
Leihothek	Münster, Germany	Wuddi, a car-sharing company, sponsored inventory. While this LoT normally charges loan fees, these items were loaned for free (Leihothek, n.d.-a). Leihothek credited Wuddi for sponsoring the items in its inventory catalogue and also wrote a blog post about Wuddi's car-sharing services (Leihothek, 2021). From the catalogue, it appears that Wuddi donated one item, though they may provide other support, such as funding, since they are listed as a premium partner on Leihothek's website (Leihothek, n.d.-b).
Knjižnica REČI	Ljubljana, Slovenia	Knjižnica REČI encourages companies to donate inventory by suggesting members will make contact with the brand and be more likely to purchase that brand if they purchase that product in the future (e.g., "try before you buy") (Knjižnica REČI, n.d.).
Fritidsbanken	Sweden (Multiple locations)	Some Fritidsbanken locations partner with the municipality to collect donations at recycling centers. Fritidsbanken will also accept donations from companies but will not display the name of the company in association with the item (i.e., sponsorships not allowed) (Fritidsbanken, n.d.-b).
La Manivelle - Lausanne	Lausanne, Switzerland	This LoT received discontinued or display models from Makita, a Japanese tool company (La Manivelle Lausanne, n.d.-b). Twenty-three of 547 items in their inventory are from Makita (La Manivelle Lausanne, n.d.-a).
Library of Things Ltd.	London, United Kingdom	This LoT receives free items from Bosch Power Tools, Kärcher New Venture, and STIHL. In exchange, the LoT shares information with the companies, such as number of times the items are borrowed and information on reparability of the products (Ethex, 2022; Library of Things Ltd., n.d.-f).
Hillsboro Library	Oregon, United States	Chimney sweep kits are available in collaboration with the local fire department (Hillsboro Public Library, 2016).

Table 4-2 Examples of Inventory Donations from Private Organizations

Handling Lost or Damaged Items

Through the course of a loan, an item may be lost or damaged, which can require additional staff or volunteer time to address and can negatively affect the next borrower's experience.

Some LoTs post the replacement cost of the item on their lending catalogue and require members to pay that amount in the case of a lost or damaged item (discussed in Section 4.4.3). On the other hand, several had a policy where the user could instead repair or replace the item with an equivalent item (often second-hand). For example, Leihbar Bonn (Germany) states:

In the event of theft or loss, the borrower has the option of handing over another item of equal value to Leihbar Bonn within 14 days in order to get his/her deposit back. Equivalent means that the replacement item can serve the same purpose as the original loan item (Leihbar Bonn, 2021).

Requesting that the member replace the item with a second-hand equivalent could result in a cheaper replacement cost for the member. It also saves staff time to find and source a suitable replacement, which could be especially time-consuming if the LoT has a policy of only sourcing items second-hand.

4.3 Value Delivery

The following sections will discuss the framework for LoT value delivery, including value proposition, venue for interaction, geographical scale, and staffing.

4.3.1 Value Proposition

The proposed framework included **reduction of transaction costs in sharing**, which was observed in practice. By providing a centralized location where the LoT handles administration, facilitation, and maintenance of goods, transaction costs are reduced. In addition, three new value propositions were added: knowledge and cultural exchange, saving space and money, and “try before you buy.” Note that these value propositions were identified for the LoT user as the customer. More options could be added if the customer were defined more broadly, such as including the government and/or the environment (see future research opportunities in Section 6.2).

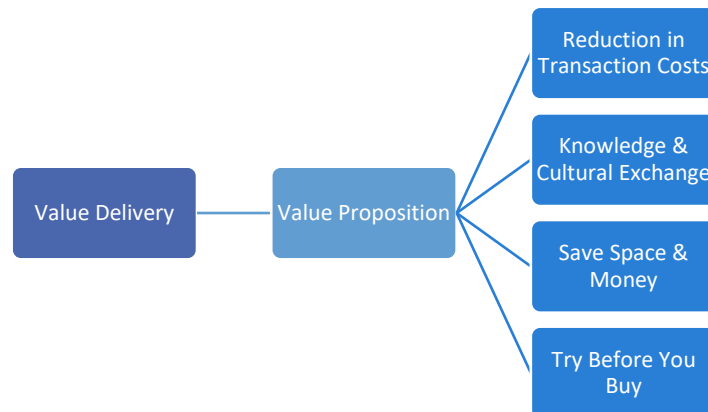


Figure 4-9 Value Proposition

Knowledge and cultural exchange was added based on the observation of numerous LoTs supplementing goods-sharing with community events, such as repair cafés, swap events, and educational events as discussed in Section 4.2.1. It was further reinforced by the interview with Leila-Bologna (Italy), where the respondent framed the LoT as a cultural activity centered around building a sharing community [R3]. Library of Things Ltd. (London, UK) also identified the socially isolated as one of their typical members, benefiting through the LoT community and events (Ethex, 2022).

Saving space and money was also added based on observation. Many LoT's highlight this as a reason to use the LoT on their websites, noting that by borrowing instead of owning infrequently used items, users can save space and money. Library of Things Ltd. (London, UK) highlights this in their item descriptions, noting how much space and money users save by borrowing instead of buying. One interviewee conducted a member survey, including questions on motivation for using the LoT [R1]. The survey found that most used the LoT to save money and space, and few used it for environmental benefits.

Another value proposition mentioned by some LoT's is so-called **“try before you buy.”** In this case, the user can borrow an item to see if they use the product frequently enough to justify purchasing it and/or if they like a specific brand or model of a product. Some LoT's highlighted this as a value proposition, such as Dover Town Library (Massachusetts, US), Beaverton Library (Oregon, US), and Share and Repair Bath (UK) (Beaverton City Library, n.d.; Dover Town Library, 2017; Share and Repair Bath, 2021).

4.3.2 Venue for Interaction

The venue for interaction encompasses the LoT's physical space, its opening hours for item exchanges, exchange options, and the lending system that facilitates reservations.

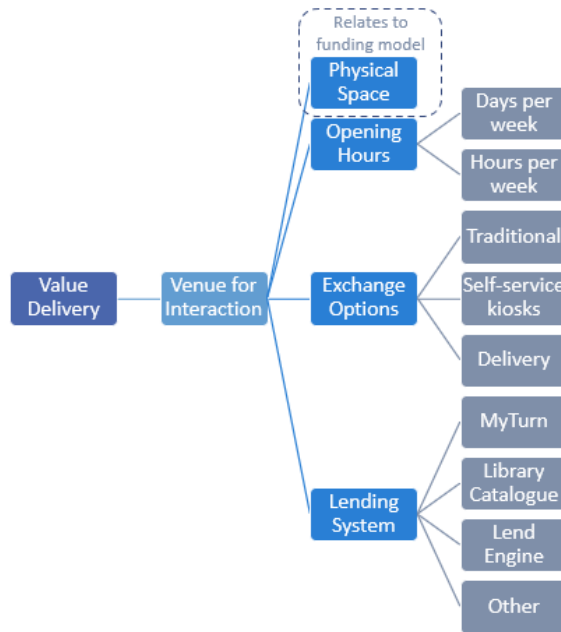


Figure 4-10 Venue for Interaction

The Physical Space

The physical space for the LoT and the storage of goods are important for LoT's based on the literature, as it can represent one of the main costs for the LoT and because a convenient location is important to members (Ameli, 2017). The Library of Things Ltd.'s (London, UK) location criteria document requires that prospective locations have high foot traffic, are located in a dense residential area, have a minimum of 8 square meters of space on the ground floor level, and a space that is open at least six days a week (Library of Things Ltd., 2022a). Library of Stuff CIC (Hull, UK) noted their LoT recently moved to a new location with better foot traffic and they had some visitors that were not members stop in out of curiosity to learn about the LoT [R1]. Thus, location can play a role in outreach to new community members.

Public-to-citizen LoTs are hosted in existing government spaces (i.e., traditional libraries). Several B2C LoTs also received their space either for free or at reduced rent, from either government or private actors. For example, Library of Stuff Mullumbimby (Australia) received a donation of a shed for storage, then received donated space to host LoT activities from a community college (Library of Stuff Mullumbimby, 2021). The LoT then outgrew that space and moved into a larger space provided by the Mullumbimby Scouts. Even still, the LoT notes that they ran out of storage space, which in turn “restricted [their] inventory growth and stopped [them from] advertising memberships” (Library of Stuff Mullumbimby, 2021, p. 20). The Library of Things Ltd. (London, UK) also receives free storage space and space to host its kiosks in existing community hubs (Baden et al., 2020; Library of Things Ltd., n.d.-f). In exchange, it claims that the community host space will benefit from about 5,000 extra visitors per year, and offers other perks such as additional press and networking (Library of Things Ltd., 2022a).

Opening Hours

Opening hours varied widely, from a couple hours per month to 60+ hours per week. Of B2C LoTs offering standard item exchanges (i.e., not self-service), the average number of opening days was three days per week with an average of four opening hours per day. Thursday and Saturday were the most popular days for opening hours (60 LoTs open each day, respectively), while Sundays were the least popular (17). Library of Things Ltd. (London, UK) requires that its kiosk locations are open at least six days a week, but prefers seven days (Library of Things Ltd., 2022a). It notes that borrowing is most popular on weekends, which is in contrast with Sundays otherwise being the least popular opening day for B2C LoTs. Public-to-citizen libraries were open six days on average, for an average of eight hours per day.

Exchange Options

While most LoTs used **traditional**, in-person exchanges at the LoT premises, two alternative exchange options were observed. First, two used **self-service kiosks** to facilitate pickup and return of items. Library of Things Ltd. (London, UK) uses kiosks for item pickups and places the kiosks in existing community spaces. This allows pickup anytime these community spaces are open (ranging from 33 to 65 hours per week). LeihBARaque (Murten, Switzerland) was the only LoT to offer 24/7 pickup using AirKey⁸ (LeihBARaque, n.d.-a). This could also help LoTs manage limited staff or volunteer time since staff are not needed to run opening hours. The Library of Things Ltd. (London, UK) hires “thing technicians” to transport items between storage and the kiosk location scheduled for pickup, among other tasks, which allows them to cover more locations and more members with fewer staff resources (Library of Things Ltd., n.d.-h). Lend Engine, a software for lending libraries, is also planning a locker solution using a digital padlock, allowing LoTs to offer self-service access to reservations [R1].

Delivery was added to the framework as a new configuration option. Seven LoTs offered delivery of their items (see Section 4.4.3 for a summary of delivery fees). One LoT, Hastings Library of Things (UK), is trialing free delivery services for those with restricted mobility (Hastings Library of Things, n.d.), thus making the LoT more accessible and inclusive. Delivery may also be offered to compensate for a less desirable LoT location, as bib der dinge Bochum (Germany) explains on their website:

Admittedly, our location is not within easy reach for the majority of Bochum's population. In an ideal world, we would have settled in the center. But the rental prices there are quite high and we should have increased the annual fee as a result. So we are

⁸ Airkey is a lock system that allows users to open a lock using their smartphones: <https://www.evva.com/int-en/products/electronic-locking-systems-accesscontrol-systems/airkey/>

grateful that we found a large storage space in the vicinity of the RuhrPark! And of course we are happy about everyone who visits us personally ... However, because we are located in the north-east of the city, we can also come to your home or place of work to deliver things you have ordered or to pick them up again after they have been used (bib der dinge Bochum, n.d.).

Lending System

All LoTs used a website and/or third-party app integration to facilitate user access to the lending catalogue and none used smartphone apps. The systems used include: MyTurn, Lend Engine, library catalogues (used by traditional libraries), and “other” solutions (e.g., custom-built systems).

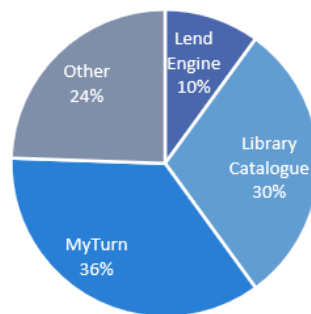


Figure 4-11 Lending Systems Used by LoTs Reviewed

Figure 4-11 presents the breakdown of lending systems used by the LoTs reviewed. First, **MyTurn** was the most used, with 32 LoTs (36%) across Europe, Australia, and North America using the software. Second, library catalogues were used by 27 LoTs (30%). This represents most, but not all public libraries. Some public libraries instead opted use custom solutions or to build a custom webpage to display LoT items. Even in cases where the library catalogue was ultimately used for the booking, several libraries used another system to provide photos and other information about the items. In a presentation to other librarians, CML (Maine, US) explains that the library’s catalogue (Minerva) is not ideal for browsing objects and does not allow photos (Curtis Memorial Library, 2021). CML posts their library on MyTurn⁹, with links to their Minerva catalogue to check status and reserve items (Curtis Memorial Library, n.d.-b). Similarly, the Dover Town Library (Massachusetts, US) opted to post photos of their items on Pinterest (Dover Town Library, n.d.). From Pinterest, the user can navigate to the item in the library catalogue. Third, nine LoTs (10%) use **Lend Engine**. All of these LoTs are located in Europe, with six based in the UK, where Lend Engine was founded (Lend Engine, n.d.). Lastly, the remaining 22 LoTs (24%) fell under “other.”

4.3.3 Geographical Scale

Figure 4-12 summarizes the geographical scales observed in practice. The majority of LoTs operated at the **local** or **regional** level, in a city, district, or provincial area. No LoTs were found to operate at the **existing community** level (i.e., a community that already has something in common, such as a school or neighborhood group) or at the national level. Existing communities, such as an apartment complex, may find that decentralized sharing models are more suitable than centralized solutions like LoTs [R6], which could explain why no LoTs were observed at this scale. **Nodes** were defined as a platform that “operates with fragmented

⁹ For the statistics in this section, CML was counted as using a library catalogue for the lending system, since this is where the user is ultimately directed for bookings.

diffusion geographically, driven by interested actors wanting to start operations in their own contexts” (Curtis, 2021, p. 1667). Two libraries were classified as nodes: Fritidsbanken and Library of Things Ltd. (London, UK). Though, it should be noted that several LoTs created “starter guides” for other LoTs and invited interested parties to contact them for advice. For example, Leila Berlin (Germany) has a page dedicated to starting an LoT (Leila Berlin, n.d.-b) and there are other LoTs by the name of “Leila” in different cities, but these have not been classified as nodes since they do not appear to be affiliated.

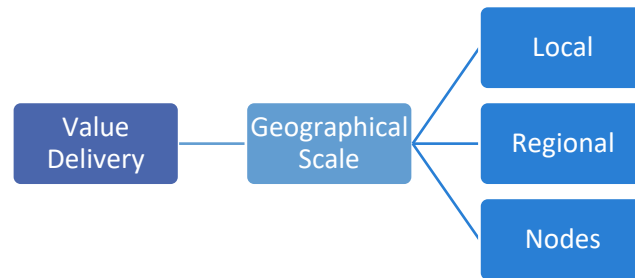


Figure 4-12 Geographical Scale

Fritidsbanken started in one location in 2013 and has since expanded to over 100 locations in Sweden (Fritidsbanken, n.d.-a). Fritidsbanken Sverige is organized as a non-profit association and owns the brand “Fritidsbanken.” Their website provides sample text that can be used by private individuals or politicians to propose that their municipality open a Fritidsbanken. A group of actors, including those in civil society, the public sector, and business community, can also come together to open a Fritidsbanken.

The Library of Things Ltd. (London, UK) was established in 2014 and started its community hub model in 2018 (Library of Things Ltd., n.d.-c). With a goal of making the LoT concept replicable, they developed lending software and began partnering with community hubs, such as libraries, to host self-service kiosks. There were seven locations as of March 2022, with a goal of expanding to 50+ locations across the UK by 2024 (Ethex, 2022). Their current crowdfunding campaign includes a plan to move beyond the community hub model to a “collaborative franchise model” which will “enable Library of Things to replicate faster, at lower cost, and in a way that is more locally-relevant”(Library of Things Ltd., n.d.-c). Library of Things Ltd. (London, UK) will continue to own and operate locations based in London, while franchising those outside of London (Ethex, 2022). So far, over 400 councils and entrepreneurial groups have already expressed interest in franchising. They have even received requests from state actors outside the UK (e.g., Spain and France), but have decided to focus on the UK for now. Revenue associated with franchising is discussed in Section 4.4.3.

4.3.4 Staffing

LoTs can be staffed by members, volunteers, and/or paid staff. Overall, 48 LoTs used volunteers in their organization and 39 used paid staff, though these numbers are likely understated. LoT websites often did not explicitly disclose their staffing and volunteer mix.

Volunteers are considered staff which do not receive monetary payment for their work, though they may receive other perks. For instance, Library of Stuff CIC (Hull, UK) allows volunteers to receive credits to borrow items for free while actively volunteering (Library of Stuff CIC, n.d.). Incentives for volunteering can also be factored into the membership model (see Section 4.4.1). For example, Knjižnica REČI offers an annual membership and allows individuals to contribute 30 hours of volunteer work in lieu of monetary payment (Knjižnica REČI, n.d.). Common volunteer roles sought by the LoTs reviewed include staffing opening hours, repair

and maintenance of items, fundraising, outreach, cataloguing items, communications, administrative tasks (accounting, website management), and organizing events.

Four staffing mixes between volunteers and paid staff were observed in practice, as depicted in Figure 4-13.

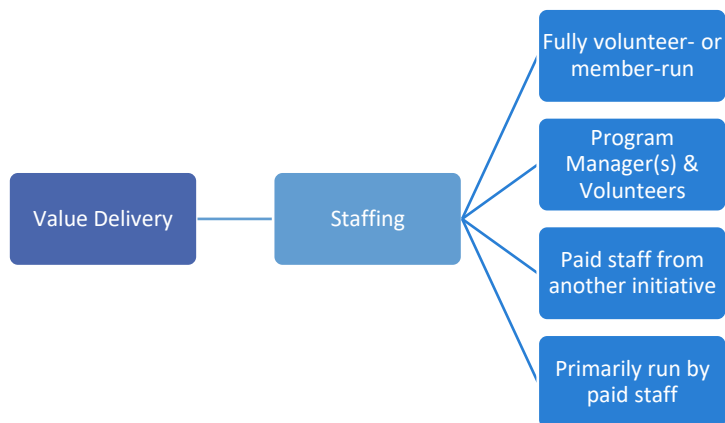


Figure 4-13 Staffing

First, some LoTs are fully run by either volunteers or members (i.e., in the case of the cooperative governance model). LoTs that explicitly stated they were fully run by volunteers or members include Library of Things YXE (Saskatoon, Canada), LeihBARaque (Murten, Switzerland), and Hastings Library of Things (UK) (Heart of Hastings CLT, n.d.; LeihBARaque, n.d.-b; Library of Things YXE, n.d.).

Second, some LoTs hired a limited number of paid staff in a program manager role (or similar). Library of Stuff Mullumbimby (Australia), for example, had one paid employee working 10-hours per week for one year (Library of Stuff Mullumbimby, 2021). They explain that having a paid coordinator is important for their work, though funding the position can be challenging:

The harsh reality of a community library like ours is that the membership fees only cover the cost of our insurance, rent and other general operating expenses. If we double our membership it is hard to imagine that the service will be sustainable with 100% volunteer operating staff. A paid coordinator is required but we believe this must be funded separately. Currently we are using a specific donation from another community member to pay a Library of Stuff Impact Amplifier for 10 hours a week for a year (Library of Stuff Mullumbimby, 2021, p. 19).

Third, some LoTs used paid staff from another non-governmental organization (NGO) or project. This mainly came in two forms: 1) the LoT is a project of another organization, which benefits from the work of paid staff at the “lead” organization, and 2) the LoT received staff through another work initiative. La Tatouthèque is an example of the latter. It is supported by SemoNord, an organization that supports youth work integration:

La Tatouthèque is managed by participants in the “Transfo” socio-professional transitional integration measure (MIS-T) and their supervisors. Our participants, aged 15 to 25, can thus develop new skills such as customer relations, business management as well as administrative or manual skills (La Tatouthèque, n.d.).

Lastly, some libraries were primarily run by paid staff. Examples include Library of Things Ltd. (London, UK), Fritidsbanken (Sweden), and public-to-citizen libraries. While these libraries may still use volunteers to some extent, they are not reliant on them for their operations.

4.4 Value Capture

Value capture typically covers revenue (Täuscher & Laudien, 2018), which is represented by the membership model, funding model, and other revenue. I have also extended value capture to include non-economic measures as well by including impact reporting. One key finding related to this topic is that none of the LoTs reviewed were self-sufficient from their membership model and other revenue. All LoTs received external funding. However, the Library of Things Ltd. (London, UK) plans to become financially self-sufficient in 2024 (Section 4.5.4).

4.4.1 Membership Model

There are many different configuration options LoTs can choose to design their membership model. The membership model contains four types of fees: membership, loan, consumable, and event fees. For each of these, there may be user-based, feature-based, and/or quantity-based price discrimination. For those that charged fees, monetary payment was an option in all cases, though several LoTs offered bartering options (e.g., item donations or volunteer commitments) in addition to or in lieu of monetary fees. Each of these decisions will relate closely to the value orientation (section 4.2.4), staffing (section 4.3.4) and funding model (section 4.4.2). A full list of membership configurations for each LoT can be found in the empirical database¹⁰.

LoTs can collect fees to fund their services, while some remain completely free to users. Figure 4-14 and Table 4-3 display the main configuration options observed in practice. Fees for events and consumables were observed less frequently (5 and 9 LoTs, respectively), so these are excluded from Table 4-3. For those that offered consumables, these were either offered at a set price or for a suggested donation.

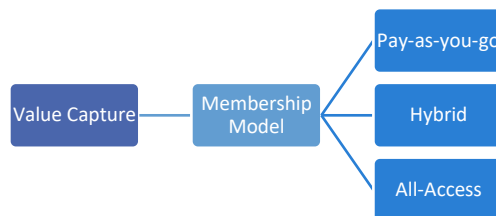


Figure 4-14 Membership Model

Type	Membership Fees	Loan Fees	Limit on # of items at once
Pay-as-you-go	No*	Yes	Rarely
Hybrid	Yes	Yes	Rarely
All-access	Yes, for the majority of B2C LoTs No, for traditional libraries	No	Often

*May require a symbolic payment of e.g., €1 to join.

Table 4-3 Summary of Membership Types

¹⁰ The empirical database can be accessed here: <https://1drv.ms/x/s!AnkQ-ESFFjZwgTafeWaBR9wWFL8H?e=z1kwbs> or by contacting the author at emily.mize@gmail.com.

First, **pay-as-you go** memberships do not charge membership fees and instead charge loan fees per borrowing. These may be popular with users in cases where a user only needs to borrow items for a special occasion (e.g., tools for a home repair project). Second, **hybrid** memberships charge both membership and loan fees. In these cases, loan fees may be lower than what would be offered in a pay-as-you-go scheme. Lastly, some LoTs operate with an **all-access** model, where members pay a membership fee for a certain timeframe and can borrow items without any loan fees. These often impose a limit on how many items a user can borrow at once. LoTs that are part of traditional libraries operate in this way, without any membership or loan fees. In the B2C context, most all-access memberships charged membership fees, though seven B2C LoTs were completely free to members. For those that charged membership fees, there were a few that offered pay-what-you-can pricing, but most membership fees were set by the LoT.

Some libraries offered more than one membership option. This effectively represents feature- and/or user-based price discrimination according to the proposed framework, where multiple options are offered to suit how members will use the library (e.g., frequency of borrowing) and/or what they can afford (e.g., may be able to afford loan fees but not an all-access membership).

For example, Biblioteca de les Coses (Barcelona, Spain) offers a pay-as-you-go option and two levels of hybrid options. The hybrid memberships have a set fee per six-month period and offer discounts on loan fees and on events. Another example, Library of Stuff CIC (Hull, UK), offers both pay-as-you-go and all-access memberships (€80/year). According to their impact report, pay-as-you-go memberships were far more popular than the all-access membership (343 vs. 18, respectively) (Library of Stuff CIC, 2021). R1 shared that pay-as-you-go memberships were more desirable for the LoT because it provides a consistent revenue stream. He also sees this as an important option for accessibility and inclusivity, as the LoT aims to set loan fees at low and reasonable rates. Thus pay-as-you-go may be more accessible than the all-access membership for some. He sees the “all-access” annual membership as serving a few purposes for members: 1) it can be useful for those planning to borrow many items (e.g., someone borrowing tools for a major home renovation), 2) for those that do not want the hassle of loan fees per borrowing, and 3) for those that believe in the LoT’s mission and want to provide extra support.

Time Commitment

Time commitments offered for memberships were typically on an annual basis. Some LoTs offered shorter commitments, including trial memberships or on a monthly-, quarterly-, or six-month basis. Offering shorter time commitments could allow more users to try the service at a lower price and for a shorter time commitment. This could be especially useful if the user only needs an item for a short period of time, such as tools for a time-limited home improvement project. However, some LoTs, especially those with strong social value orientations, may prefer longer membership commitments to build a sense of community. For instance, Leila Berlin (Germany) requires a minimum of three months for membership because they want “permanent and satisfied members” (Leila Berlin, n.d.-c). Similarly, those operating under a cooperative governance model may prefer longer memberships since members would also run the LoT.

Customer Segments

The default membership offering was provided to individuals, though some LoTs also offered memberships to other types of customers. For individuals, there was typically a standard price set by the LoT, then some also offered concession and/or supporter memberships. Concession memberships may be handled informally on a case-by-case basis or may be set by the LoT. For instance, La Trucothèque (Neuchâtel, Switzerland) states on its website: “if the price we have set is too expensive for you and you are interested in the principle but you cannot afford it,

COME, we are completely open to discuss and help you” (La Trucothèque, n.d.). Others may offer set concession pricing for specific target groups (e.g., students, pensioners, or low-income individuals). For example, La Manivelle - Geneva (Switzerland) offers a half-price concession membership for those with monthly income of less than CHF 4,000 (€3,934).

Some LoTs offered supporter memberships for those that were able to pay more than the standard fee and wished to support the LoT’s mission. In some cases, LoTs offer both supporter and concession memberships, using the extra fees from the supporter membership to offset the discount on concession memberships (e.g., Share Bristol (UK)).

Beyond individuals, some LoTs offered memberships to households, schools, non-profit associations, and companies. Within these categories, LoTs typically further differentiated by size of the organization. For example, La Manivelle (Nyon, Switzerland) offered memberships for companies based on the number of employees (up to 10, 11 to 100, or 100+ employees) (La Manivelle Nyon, n.d.).

4.4.2 Funding Model

The funding model includes any contributions to the LoT not tied to the core transactions for LoT services provided. As mentioned earlier, all LoTs received outside funding in some form, and therefore, none were financially self-sufficient. Figure 4-15 summarizes the type, provider, frequency, restrictions, and consideration provided in return for funding, which were seen in varying combinations across the LoTs reviewed.

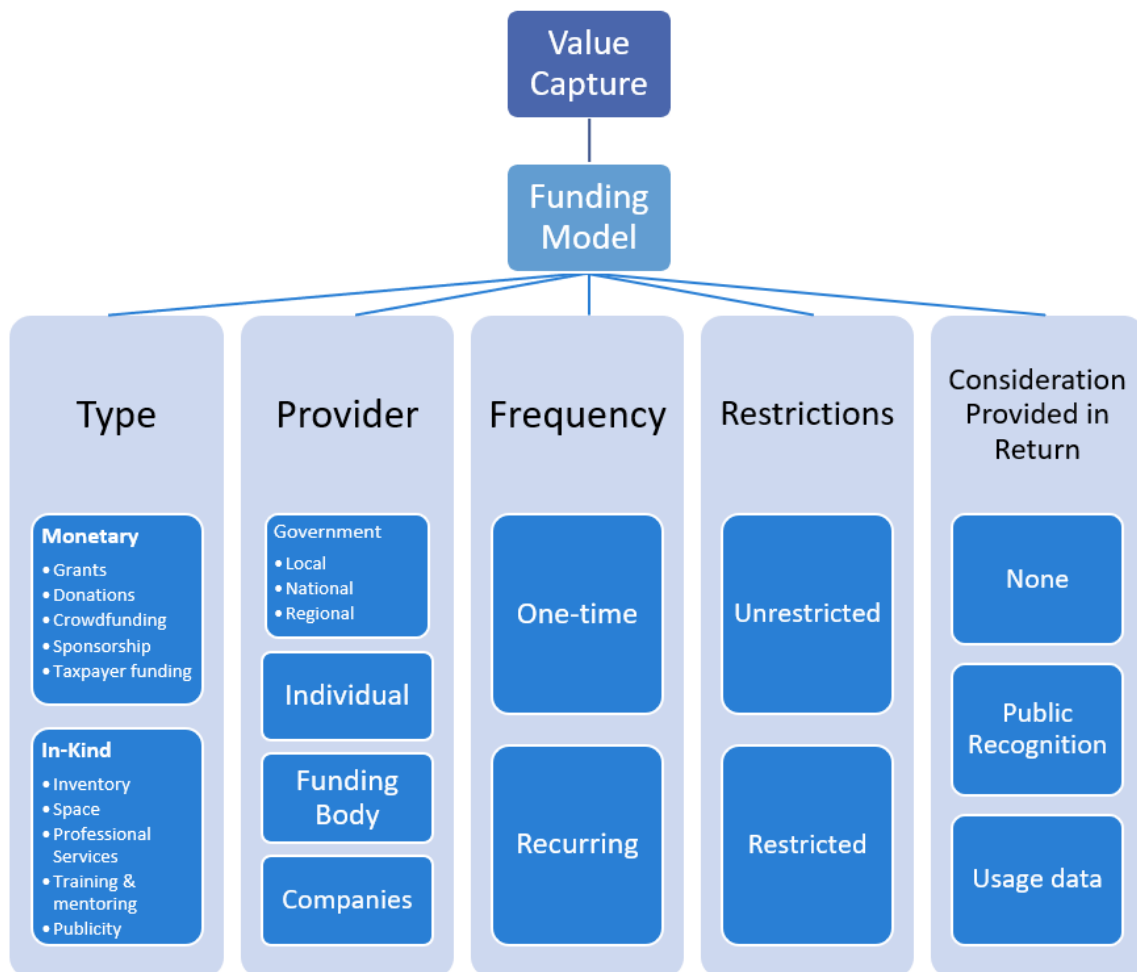


Figure 4-15 Funding Model

First, funding can come in the form of monetary and in-kind contributions. In the final framework, the monetary funding options were disaggregated further compared to the proposed framework. Grants, donations, and taxpayer funding are captured separately here, as these were distinct funding sources observed and represent different avenues LoTs can use to obtain funding. Additional in-kind donations were added to the framework based on observation, including professional services, training and mentoring, and publicity. See Section 4.2.5 for discussion of in-kind donations of inventory and inventory sponsorship and Section 4.3.2 for discussion of space donations. Donation of professional services may include repair services, logo design, or strategic consulting. Training and mentoring can also be provided in isolation or in combination with a grant. For instance, Library of Things Prague (Czech Republic) received a training session from O2 Foundation (Library of Things Prague, 2017). La Manivelle Geneva (Switzerland) also asked for support via publicity for the LoT: “If you support our values you can talk about us in your newsletter, in articles on the web, in social networks” (La Manivelle Geneva, n.d.-a).

Second, funding providers include the government, individuals, funding bodies, and companies. The final framework changed municipality to the broader term of government, since the LoTs reviewed received funding from multiple levels of government, including the local, national, and regional (e.g., EU) level.

Third, funding can be provided on either a one-time or recurring basis. One-time funding would include, for example, a crowdfunding campaign or a one-time grant. Recurring funding would include, for instance, traditional libraries that receive recurring funding from taxpayers and dedicated funding bodies (e.g., Friends of the Library organizations, common in US public libraries). Grants could also be one-time or recurring in nature, but this was not readily apparent based on most LoT websites.

Fourth, the provider may impose restrictions on how the funding is used. For instance, Library of Things Ltd. (London, UK) cited restrictions from funding providers as one of the reasons they reorganized as a private company limited by shares instead of a charity (Library of Things Ltd., 2019). In a blog post, they explain: “[m]any grants are restricted: ‘No you can’t actually use this grant to pay for the core operational and business development work that you need to do to stop needing us – you have to use it on this particular outreach project’” (Library of Things Ltd., 2019).

Lastly, LoTs may or may not provide some form of consideration back to funding providers. Fritidsbanken will only accept outright gifts and displays all donor names on the same list, with the same emphasis, regardless of the amount donated. Often, however, LoTs will provide public recognition of the funding provider via the LoT’s website or social media. Some may also include tiers based on the funding amount provided (e.g., bronze, silver, or gold level funders). Library of Things Ltd. (London, UK) provides its inventory providers (e.g., Bosch) with usage statistics in exchange for free inventory (Ethex, 2022; Library of Things Ltd., n.d.-f). It also provides them with valuable information for their circular economy strategy. For example, whether certain pieces of a drill break easily or are difficult to repair. Similarly, in exchange for free community hub space for lending kiosks, Library of Things Ltd. (London, UK) argues that it will provide benefits to the host space. For example, it says it will attract 5,000 additional visits per year to the community space, and offer additional networking opportunities, amongst other benefits (Library of Things Ltd., 2022a).

4.4.3 Other Revenue

Other revenue includes other miscellaneous fees and revenue streams outside the membership and funding models. Figure 4-16 summarizes the other revenue streams used in practice by LoTs based on the empirical data collected.

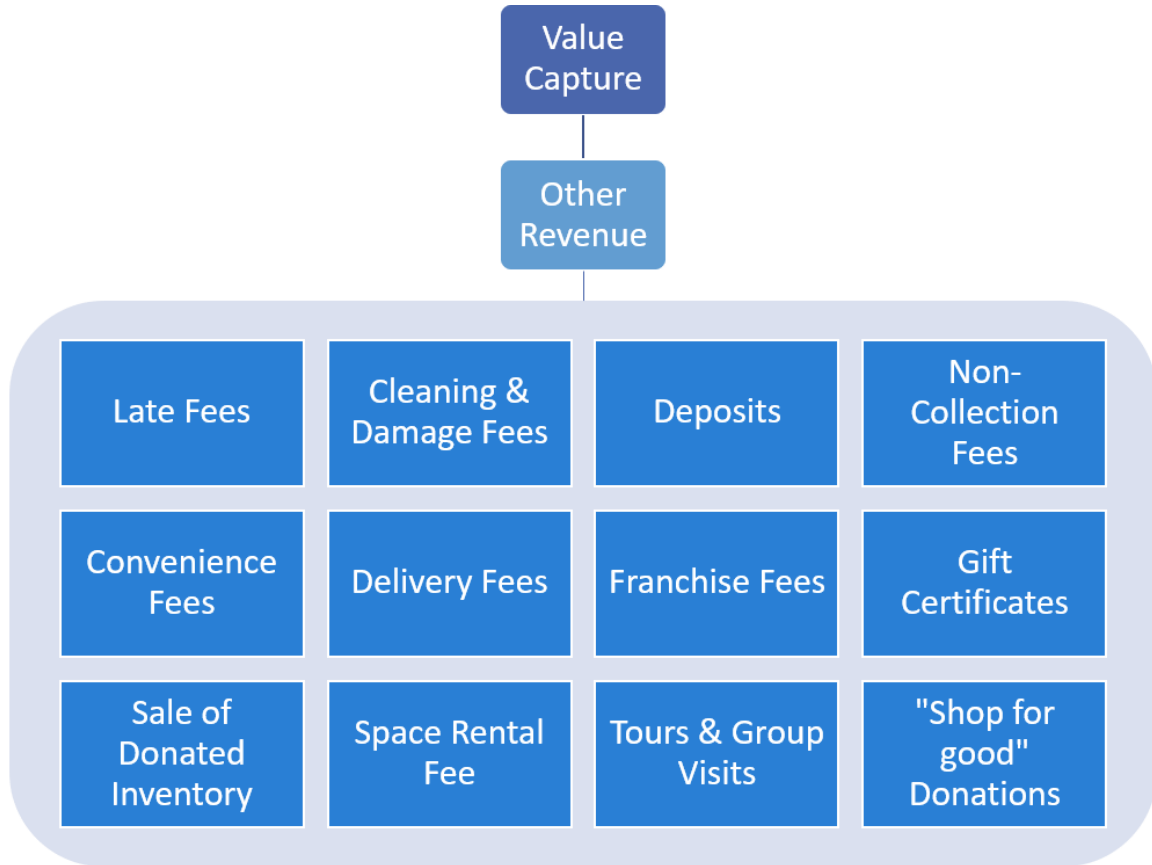


Figure 4-16 Other Revenue

Late Fees

Late fees can be charged as a penalty when an item is returned after its due date. The decision to charge late fees was mixed amongst the LoTs reviewed. Some charged late fees, while other LoTs specifically stated they were “fine free.”

Many traditional libraries in particular stated that they are fine-free. Elmhurst Public Library (Illinois, US) has gone fine-free to “remove barriers to accessing the Library and help provide an equitable experience for all people” and for “staff to focus on more positive interactions with [their] visitors” (Elmhurst Public Library, n.d.). They noted that fines made up only a small percentage of their budget and that “[l]ibraries that have gone fine free have not seen any difference in when items are returned” (Elmhurst Public Library, n.d.). Others that are fine-free use moral appeals to encourage timely returns. For example, Kitchener-Waterloo Library of Things (Canada) states “we do rely on members returning items on time, to ensure those who have reserved them next have access to items when they need them (not having the tent for camping is kind of a big deal!)” (KW Library of Things, n.d.-a).

While LoTs may seek to avoid late fees, they may find it necessary to start charging them as the member base grows. La Manivelle Geneva (Switzerland) explained that while they initially did not have loan fees, they found it necessary to add them due to too many late returns:

After more than 2 years of loan service, and with a growing number of loans, La Manivelle is in the process of becoming more professional. After a period of launch and trust, we are still seeing too many delays in loan returns, which takes up a lot of energy and time and penalizes other users who are waiting on objects. This is why we have decided to introduce a late fee of 1 CHF per item per day of UNWARNED delay to improve the quality of service (La Manivelle Geneva, n.d.-b).

Of those that charged late fees, some charged late fees only for the days the LoT was open (e.g., LeihBARaque (Murten, Switzerland)) while some charged late fees every day even if the LoT was not open (e.g., Borrow Don't Buy (Plymouth, UK)). Some charged flat rates of a couple euros per day, while some charged the late fee as a certain rate of the loan fee. For instance, Share:Frome (UK) charges double the loan fee for each open day the item is late and Library of Things Ltd. (London, UK) charges 1.5 times the loan fee for each day the item is late (Gill, 2022b; SHARE:Frome, 2020).

Cleaning & Damage Fees

Items returned in dirty or damaged condition require additional staff time to maintain. Brendan Lax of the Hillsboro Public Library (Oregon, US) reflects on cleaning challenges at the LoT, stating:

Recently, I found myself laying out a 10' x 10' [3m x 3 m] green screen cloth on the floor of our technical services area and removing an excessive amount of dog hair with a lint roller. Several hours later, I was using a letter opener to scrape congealed oil and salt from the crevasses of a commercial popcorn popper, trying to clean out as much as I could to prevent corrosion of the internal wiring. ... I had more than one item appear on my desk for repair with a note saying "smells like cat urine" (Lax, 2020, p. 58).

Similarly, Library of Things Ltd. (London, UK) highlights the impact that returning an item in poor condition has on its staff and other members:

We determine what the appropriate fee is to charge depending on the state of the Thing and how much time out of their regular maintenance sessions it took our Thing Technicians to clean. Again, these fees are to prevent the next borrower having a bad experience. (Library of Things Ltd., n.d.-e).

As an alternative or supplement to cleaning and damage fees, LoTs may charge replacement fees for items that are damaged or lost (as discussed in Section 4.2.5).

Deposits

Many LoTs charge deposits for high-value items to mitigate financial loss if the item is lost or damaged. Deposits can also be a means to ensure the fees discussed in the previous sections can be collected. Without deposits, it may be difficult to enforce the fees if the LoT does not store a credit card on file for the user. Twenty-two of the 90 LoTs reviewed charged deposits.

Policies vary, but as an example, Leihladen Bochum (Germany) reserves the right to charge deposits of up to 80% of item value (Leihladen Bochum, 2018). They do, however, waive deposits for so-called "proven members," which have borrowed and returned at least five items on time and in proper condition.

Non-Collection Fees

A few LoTs charged non-collection fees in cases where reserved items were not picked up. They justified the fee because the reservation blocks another member from borrowing the item, and by not picking up a reserved item, it is unnecessarily idle.

Convenience Fees

Curtis (2021) defined convenience fees as “a percentage fee to cover operating costs associated with managing the LoT (e.g. 1.5% of the price)” (p. 1668). I expand this to include percentage and flat-rate fees with a similar intent (i.e., to cover administrative costs or to pass along fees charged by the online payment service provider). These fees were not commonly used, with only three LoTs reviewed charging convenience fees. Two charged convenience fees for online payments and one charged a flat-rate fee to cover administrative costs for first-time members.

Delivery Fees

As discussed in Section 4.3.2 seven LoTs offered delivery services, of which six charged fees. Of those that charge fees, some charge flat rates and some charge based on distance. Table 4-4 provides the specific terms and fees for the six that charged delivery fees.

Name	Delivery Terms & Fees
Kitchener-Waterloo Library of Things (Canada)	CAD 10 (€7.32) fee for home delivery and pickup. CAD 5 (€3.66) fee for delivery and pickup from a community center (KW Library of Things, n.d.-b).
bib der dinge Bochum (Germany)	€3 per delivery or pickup. Items that are too large to deliver or require detailed instructions before use cannot be delivered (bib der dinge Bochum, n.d.).
Leila-Bologna (Italy)	€2 per delivery or collection within city center walls. €3.50 per delivery or collection outside city center walls (Leila-Bologna, n.d.).
Leihlager (Basel, Switzerland)	CHF 5 (€4.80) per delivery or collection by bike. Must request at least an hour in advance (Leihlager, 2021).
Share and Repair Bath (UK)	Member must contact the LoT to request delivery or pickup. No pricing listed on their website (Share and Repair Bath, n.d.-a).
Share Oxford (UK)	Charge £1 (€1.19) per mile (1.6km) (SHARE Oxford, 2019).

Table 4-4 Summary of Delivery Fees Charged by LoTs Reviewed

Franchise Fees

LoTs using the node structure discussed in Section 4.3.3 may use franchise fees. Fritidsbanken Sverige (Sweden) runs as a non-profit organization, supporting local Fritidsbanken locations without charging any fees (Fritidsbanken, n.d.-b). On the other hand, Library of Things Ltd. (London, UK) is planning to start a franchising model in the latter half of 2022 (Ethex, 2022). It will continue to own and operate locations launched in London but will franchise to local partners for locations outside of London. In this case, the local partner will keep the majority of borrowing fees and Library of Things Ltd. will receive a minority of borrowing fees (Library of Things Ltd., 2022b). In exchange Library of Things Ltd. provides support such as training, software, and customer service.

Gift Certificates

Gift certificates are another potential method to bring in additional revenue by attracting new members, membership renewals, or by offering gift certificates for higher membership plans. For instance, Share and Repair Bath (UK) offers gift certificates for ‘Proud Supporter’

memberships for £40 (€48) or the ‘Super Supporter’ membership for £80 (€95) (Share and Repair Bath, n.d.-b). Twelve LoTs reviewed offered a gift certificate option.

Sale of Donated Inventory

Many LoTs accept item donations, though may find that some donated items are not a good fit for their inventory. Four LoTs included disclaimers on their websites that they reserve the right to sell donated inventory. For example, SHARE:Frome (UK) states: “we have a criteria for deciding what things we stock. However, if you are looking to declutter, we can take most items and put them in a sale to raise funds” (SHARE:Frome, n.d.).

Space Rental Fee

Three LoTs (leih.lokal (Karlsruhe, Germany), Leila-Bologna (Italy), and Share Bristol (UK)) offered space rentals to individuals and community organizations. This can provide an additional revenue stream, especially if the LoT has limited opening hours and the space is otherwise idle. For example, Share Bristol reserves half of its space for the LoT and rents the other half out when not in use (Share Bristol, 2021). They charge £7.50 (€9) per hour for space rental.

Tour & Group Visits

One LoT, Leila Berlin (Germany), offered educational tours. On these tours, they provide information on the sharing economy, sustainable consumption, and the concept of commoning (Leila Berlin, n.d.-a). While they do not charge directly for these visits, they ask that tour groups bring an item to share with the LoT and also accept monetary donations. They have held at least 18 tours based on their website.

“Shop for Good” Donations

A few LoTs used “shop for good” affiliations to collect additional donations. In the schemes, “shop for good” platforms will donate a percentage of the sales price to the organization selected. Individuals navigate to an online store through a “shop for good” site or special URL, then purchase as they normally would, with the “shop for good” platform paying the LoT a percentage donation. Share Bristol (UK) uses “Easy Fundraising” for this purpose, which partners with over 4,000 retailers. In the US, four traditional libraries with LoTs were registered on Amazon Smile.

4.4.4 Sustainability Performance

Two sustainability performance indicators were included in the proposed framework: 1) possessing a non-pecuniary motivation for ownership of goods and 2) leveraging idling capacity of an *existing* stock of goods. A new indicator was added for green procurement criteria if goods are purchased new, based on the empirical data collected (Figure 4-17).

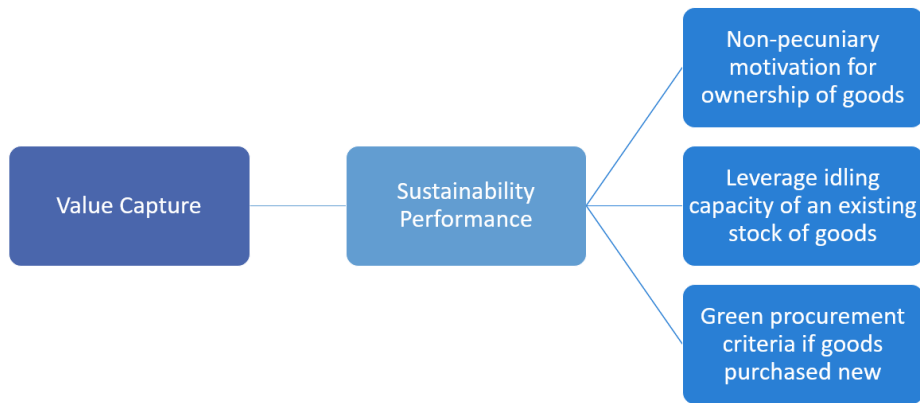


Figure 4-17 Sustainability Performance

All LoTs reviewed met the **non-pecuniary motivation for ownership of goods** indicator; that is, the organization is not motivated by money. LoTs are motivated by environmental, social, and/or societal missions (Section 4.2.4) and most are organized as non-profits or similar (Section 4.2.2). One could argue whether Library of Things Ltd. (London, UK) meets this criterion now, and if it does, whether it will continue to do so in the future. The LoT's legal form is a private company limited by shares, which it explains as somewhere between a non-profit and for-profit entity (Library of Things Ltd., 2019). The governance structure protects the LoT's social mission through a guardian share, which is held by "external individuals representing community and planet" (Library of Things Ltd., 2019). Its growth plans do, however, forecast breaking even in 2024, then for subsequent years, earning net profit after tax of up to £834 thousand (€999 thousand) by 2029 (Ethex, 2022).

The second indicator of loaning **existing goods** rather than purchasing new was observed to some extent. Most LoTs source at least some inventory from in-kind donations, while others state their inventory is exclusively from donations. Presumably, most donated items are second-hand, though there is the possibility that a donor may purchase an item new to donate to the library (e.g., to provide a hard-to-source or expensive item from the LoT's wish list). There were several that noted that most inventory was donated, but some items were purchased new.

The third indicator of **green procurement criteria if goods are purchased new** was added based on CML's (Maine, US) inventory criteria document. When acquiring inventory, they consider factors such as where the item was made, what type of supplier it comes from (e.g., a local business), whether it aligns with an SDG, whether it aligns with library programming or a community group's work, what end-of-life disposal options exist, and whether it contains any harmful materials (Section 4.2.5). LoTs can consider which procurement criteria are most relevant in their context to guide their inventory sourcing.

4.4.5 Impact Reporting

Impact reporting includes reporting on the environmental, social, and/or economic contributions of the LoT. Figure 4-18 displays the reporting options seen in practice. Of those that engaged in impact reporting, most conducted this at the LoT-level. This could range from an extensive impact report to a few key statistics on the website (e.g., number of loans or members). Only one library, the Library of Things Ltd. (London, UK) provided impact statistics at the inventory item-level.

LoT-Level Reporting

In total, 16 LoTs provided LoT-level impact reporting on at least one category. Figure 4-19 presents a total of LoTs reporting on each category. The most commonly reported categories were statistics on loans (e.g., total loans), members (e.g., total members, member location or other demographic information), and on inventory (e.g., most popular items). It is also worth noting that while only two LoTs reported on waste or emissions avoided, other LoTs expressed interest in carbon emission reporting in the future [R1] (SHARE Oxford, 2021). The LoTs that reported on the most categories were Share Oxford (UK), Library of Stuff CIC (Hull, UK), and Library of Stuff Mullumbimby (Australia). Compared to the original framework proposed in Section 2.7.1, all proposed reporting categories appeared in practice except reporting on items repaired. Eight new categories were added based on observation.

To better understand motivations behind LoT-level reporting, I spoke with R1 from Library of Stuff CIC (Hull, UK). R1 shared that one motivation for producing the report is from a regulatory standpoint: CICs in the UK are required to report on their impact and benefits to the community. However, the required reporting is rather generic, and this LoT provides additional reporting beyond the regulatory requirements. They were motivated to produce a robust impact report because they believe it is helpful for messaging the LoT’s aims and impact with funders and the community. Share Oxford (UK) explains that they produce impact reports for their members, volunteers, supporters, and the broader community “to keep [them] accountable and making sure the Library is meeting the community need” (SHARE Oxford, 2020).

In terms of time and effort to produce the report, R1 estimated that it requires about 24 hours per report. Though, R1 has previous work experience in data analysis and reporting that may expedite the process. Library of Stuff Mullumbimby (Australia) was able to produce an impact report because it received funding for a one year, 10-hour per week Impact Amplifier position (Library of Stuff Mullumbimby, 2021). Thus, for LoTs without sufficient volunteer time, staff funding, or the required skillsets, it may not be feasible to produce impact reporting.

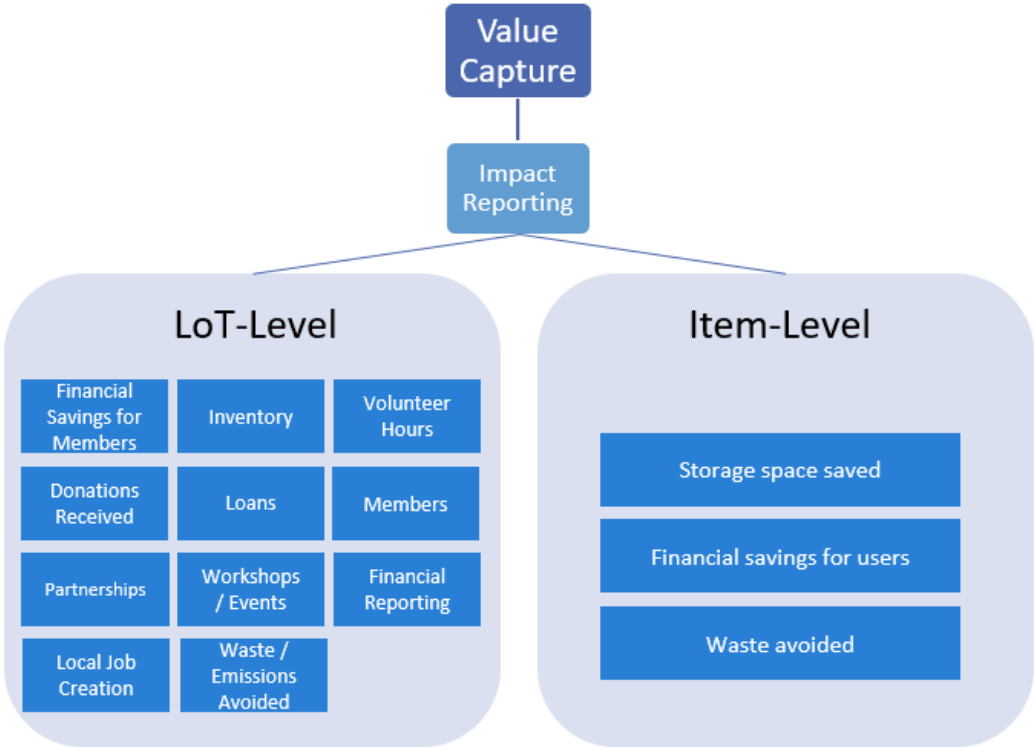


Figure 4-18 Impact Reporting

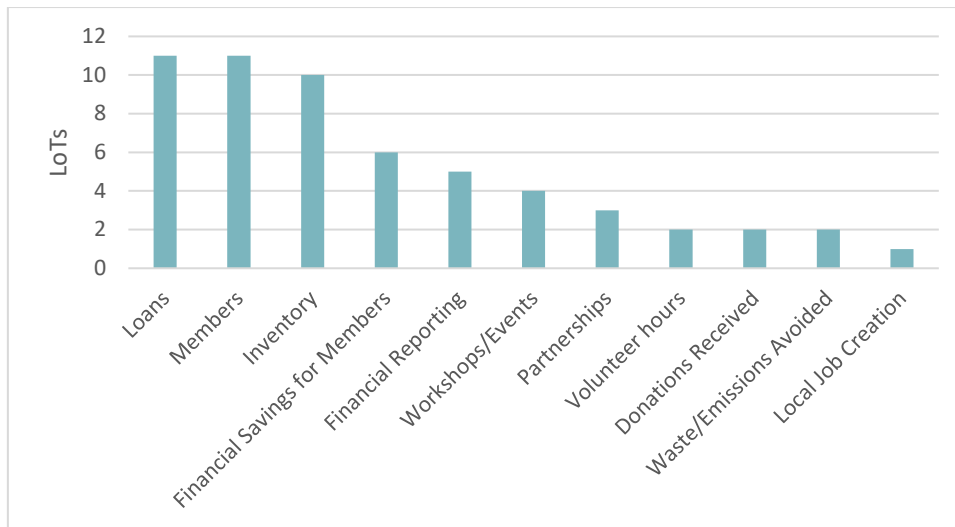


Figure 4-19 Number of LoTs reporting on each impact category

Item-Level Reporting

The Library of Things Ltd. (London, UK) was the only LoT to report impact at the item-level. They reported on storage space saved, financial savings for users, and waste avoided. For instance, for a drill, they state that this saves 0.158m² of space, costs £145 (€172) less to borrow than purchasing at retail price, and saves 1.5 kg of waste from landfill (Library of Things Ltd., n.d.-d). Members can also track their personal impact based on their borrowing habits. It should be noted that this LoT stocks limited categories of items (around 50 types of items) and has developed proprietary software, which may make this tracking more feasible.

4.5 Dominant Archetypes

The data collected across LoTs was reviewed to identify patterns and develop archetypes of LoTs. The archetypes were determined qualitatively, based on important themes from the literature and themes that emerged through the empirical data collected on 90 LoTs. These themes were compared across the empirical database for similarities and differences, to develop archetypes. The important themes from the literature included **inventory management**, **venue for interaction**, **staffing**, **membership model**, and **funding model**. Through the empirical data collected, **marketplace type**, **governance model**, **value orientation**, and **geographical scale** also emerged as important themes, where variation was observed. Four archetypes were identified: **Public-to-Citizen LoTs**, **Community-Driven Free LoTs**, **Community-Driven Paid LoTs**, and **Scaling Paid LoTs**. The following sections will discuss the dominant configurations for each archetype. The data is derived from the empirical database unless cited otherwise.



Figure 4-20 Overview of Dominant Archetypes

4.5.1 Public-to-Citizen LoTs

This archetype was dominant in the US, with all 28 US LoTs following this model. Beyond the US, Banff Public Library (Canada) and Biblioth que de Bagnes (Switzerland) are also included in this archetype. Dominant configuration options for this archetype are displayed in Table 4-5. To illustrate an example of this archetype, I will describe CML (Maine, US) against the LoT BM framework.

Business Model Framework	Dominant Configurations
Marketplace Type	Public-to-Citizen
Governance Model	Formal
Value Orientation	Social
Inventory Management: Sourcing	Mix of purchasing new, second-hand, and donations
Venue for Interaction: Physical Space	Government-provided
Venue for Interaction: Opening Hours	40+ hours/week
Lending System	Library catalogue
Geographical Scale	Local or regional
Staffing	Primarily run by paid staff
Membership Model	All-access (free)
Funding Model	Taxpayer funding & recurring private funding (e.g., Friends of the Library)

Table 4-5 Dominant BM Configurations for Public-to-Citizen LoTs

Value Creation

CML’s **key activities** are providing short-term access to under-utilized goods and sharing of knowledge and skills. Regarding knowledge-sharing, the library emphasizes the educational component of the its LoT offering and that inventory purchased from CML’s budget is tied to the library’s programming (Curtis Memorial Library, 2021). CML is operated by the Brunswick Public Library Association, which is a non-profit receiving both municipal and other funding (Curtis Memorial Library, n.d.-a). Its website notes that “though not a municipal department, the library formally serves the Towns of Brunswick (20,278) and Harpswell (4,740)” in Maine,

US. (Curtis Memorial Library, n.d.-a). Thus, I have still classified this LoT as the public-to-citizen **marketplace**. Its **governance model** is mainly formal, though member input is solicited through e.g., a rank choice voting matrix for inventory [R6]. CML's **value orientation** is most aligned with social, with a focus on educational programming to accompany the goods and providing items in line with community needs. Environmental orientation was also evident through the inventory sourcing criteria and linkage to SDG 12: Responsible Consumption and Production (Curtis Memorial Library, n.d.-d).

CML has over 300 items in its **inventory**, across categories such as kitchen, science and technology, gardening, crafts, and sports (Curtis Memorial Library, n.d.-b). To the extent the LoT purchases an item, they make sure it is tied to programming or community needs (Curtis Memorial Library, 2021). For donated items, they may accept items that are not tied to programming. The LoT typically stocks items that are in the \$200-300 (€180-270) price range that are used infrequently on an individual basis (Curtis Memorial Library, 2021). The LoT has a robust criteria document to guide inventory acquisition (both for donations and purchases), as discussed in Section 4.2.5. The LoT also has an extensive wish list of items for donations from organizations or individuals, which describes what items they are seeking, whether the item should be provided new or second-hand, and how many units they would like (Curtis Memorial Library, n.d.-c). If an item is lost or damaged, the LoT will charge the member for reasonable repair or replacement costs.

Value Delivery

CML's **value propositions** are the reduction of transaction costs, knowledge and cultural exchange, saving space and money, and “try before you buy.” Regarding the **venue for interaction** and **geographical scale**, the LoT is hosted in the public library, which only has one location. **Opening hours** were offered seven days per week, with 62 hours per week in total. The **lending system** uses MyTurn to display the inventory, but refers users to the library catalogue, Minerva, to check availability and reserve the item (Curtis Memorial Library, n.d.-b). The LoT shares paid staff with other library departments (**staffing mix**) [R6].

Value Capture

CML's **membership model** is all-access, without any membership or loan fees. Municipal **funding** is provided through the provision of space and provision of funding for staff salaries [R6]. The library collections, including the LoT items, are purchased with funds raised by the non-profit [R6]. The library's website notes other funding sources for the operating budget include “annual giving, unrestricted donations, grants, endowment fund earnings and Friends of the Library support” (Curtis Memorial Library, n.d.-a). The “friends of the library” type of organization was common across U.S. public libraries. The LoT also won a Minerva Innovation Grant that allowed them to buy additional inventory (Curtis Memorial Library, 2021). The LoT did not collect any **other revenue** and did not engage in **impact reporting**. For **sustainability performance**, the LoT possesses a non-pecuniary motivation for ownership and uses green procurement criteria. It also shares existing goods in some cases (i.e., for those acquired second-hand).

4.5.2 Community-Driven Free LoTs

This archetype includes B2C LoTs that provide free, all-access memberships. These libraries are generally able to offer free memberships because they keep their costs extremely low through staffing the LoT with volunteers and through in-kind donations (e.g., inventory and/or space). They may also receive monetary donations or grants to supplement operations, but they are typically less dependent on these. Table 4-6 provides dominant configurations for this

archetype. As an example, this archetype will be illustrated with Library of Things YXE (Saskatoon, Canada).

Business Model Framework	Dominant Configurations
Marketplace Type	Business-to-Consumer
Inventory Management: Content	Wide range
Inventory Management: Sourcing	Donations from individuals
Venue for Interaction: Physical Space	Often donated
Venue for Interaction: Opening Hours	Limited
Venue for Interaction: Lending System	MyTurn, Lend Engine, or other
Geographical Scale	Local
Staffing	Volunteers/members
Membership Model	All-access (free)
Funding Model	Donations: money, inventory, space

Table 4-6 Dominant BM Configurations for Community-Driven Free LoTs

Value Creation

This LoT's **key activity** is providing short-term access to under-utilized goods. It operates as a B2C **marketplace** and though its **governance model** is not explicitly disclosed, it trends toward more member involvement since it is fully volunteer-run (**staffing mix**) (Library of Things YXE, n.d.). It operates at the local level (**geographical scale**) and though its **value orientation** is not mentioned explicitly, it seems logical that it has at least a social orientation since it is offered as a free service and requires community support through volunteering. The LoT has a diverse range of **inventory**, with nearly 700 items across 16 categories. Inventory is fully sourced through community member donations. The LoT posts a wishlist for inventory items and requests that potential donors review donation guidelines and email the LoT before bringing a donation. Guidelines indicate that items must be clean and in working order, cannot be petrol-powered, and must be small and light enough to transport down stairs.

Value Delivery

The **value proposition** is the reduction of transaction costs. The LoT operates at the local level (**geographical scale**) and its **venue for interaction** is the LoT's space in the basement of The Better Good. The Better Good is a shop that describes itself as "a place to find better choices for everyday needs" (The Better Good, n.d.-b) and donates the space to the LoT. The LoT has very limited **opening hours**, only open two Saturdays per month for three hours each; however, it partially overcomes this limitation on the loan return side by allowing members to return items any time The Better Good is open: seven days per week, 51.5 hours in total (The Better Good, n.d.-a). The LoT's **staffing mix** is completely volunteer-run, though it benefits from a small amount of The Better Good staff time, since they will accept loan returns when the LoT is closed (Library of Things YXE, n.d.). The check-in process is then handled by LoT volunteers during the next shift.

Value Capture

The LoT's **membership model** is all-access without membership or loan fees. For **funding**, it appears the LoT only receives in-kind contributions (i.e., inventory and space donations). It does not solicit any monetary donations or collect any money through other revenue streams (i.e., no deposits or late fees). The LoT achieves **sustainability performance** by possessing a non-pecuniary motivation for ownership and by sharing of existing goods (i.e., donated used items in lieu of new purchases). It does not produce **impact reporting**, which could relate to

limited resources due to use of volunteers, or it may be viewed as lower priority task since the organization does not appear to seek grants or other outside funding.

4.5.3 Community-Driven Paid LoTs

This archetype includes B2C LoTs that receive a mix of funding through their membership and funding models. In contrast to Community-Driven Free LoTs, this archetype charges membership and/or loan fees, though it may offer bartering options in addition to or in lieu of monetary payment (e.g., donation of an item or time instead of payment). This archetype may offer pay-as-you-go, hybrid, and/or paid all-access memberships, often with concession and/or supporter pricing options. These LoTs often employ a creative funding model, receiving funding from many sources and in many forms. Monetary funding may often be on a one-time basis, but other in-kind funding such as inventory or space donations may be on a recurring basis. The staffing mix includes volunteers and may include paid staff. In contrast to Scaling Paid LoTs, this archetype provides a wide range of goods. Table 4-7 presents the dominant configurations, and the following paragraphs will illustrate this archetype using Knjižnica REČI (Ljubljana, Slovenia) as an example.

Business Model Framework	Dominant Configurations
Marketplace Type	Business-to-Consumer
Governance Model	Any
Inventory Management: Content	Wide range
Inventory Management: Sourcing	Mix of purchase new, second-hand, and donations
Venue for Interaction: Opening Hours	Varies from 1 to 168 hours/week; majority had 12 hours/week or less
Venue for Interaction: Lending System	MyTurn, Lend Engine, or other
Venue for Interaction: Alternative Pickup	Some offer delivery or self-service pickup
Geographical Scale	Local
Staffing	Volunteers, paid role, or part of another project
Membership Model: Overall	Pay-as-you-go, hybrid, and/or all-access (paid)
Membership Model: Customer Segments	Concession and/or supporter options are common
Funding Model	Often use a creative funding mix from a variety of sources. Often in the form of one-time funding, though may have some recurring funding (e.g., provision of space)
Impact Reporting	Some produced LoT-level reporting

Table 4-7 Dominant BM Configurations for Community-Driven Paid LoTs

Value Creation

Knjižnice REČI opened in Ljubljana, Slovenia in 2014 (Cvetko, 2014). Its **key activities** are providing short-term access to under-utilized goods and sharing knowledge and skills. It has hosted skill-sharing events such as art and writing workshops. As of April 2022, it had an open call for new workshop ideas from youth applicants (Knjižnica REČI, 2022). The LoT will select seven new activities to host, providing the organizers with advice and up to €200 to purchase materials for the workshop. It operates as a B2C **marketplace**. In a guide it publishes to share knowledge with other LoTs (primarily in the Slovenian context), it recommends organizing as either 1) an institute or society or 2) a cooperative or social enterprise. It notes that these legal forms are eligible for social entrepreneurship tenders and that these forms can use municipal

premises for free (Knjižnica REČI, 2015). The **governance model** was not explicitly described but likely aligns with the collaborative model. When the LoT started, it engaged the community to generate a wishlist of inventory people wanted to borrow and it also engages volunteers in its operation. The LoT exhibits all three **value orientations**: societal, social, and environmental. Its **inventory** contains over 230 items across twelve categories. It sources its inventory through donations from individuals and companies. The LoT posts a wishlist of items, and one of the ways to gain membership is by donating an item from the wishlist. It notes that the majority of items in the LoT come from individual donations in exchange for membership (Knjižnica REČI, n.d.). Companies are also invited to contribute inventory. The LoT notes that items in an LoT have higher use-intensity than under individual ownership, thus high-quality items are needed. Further, the donor company benefits through additional exposure:

Things in the library of things [are] used and worn much more often than in a normal household. Therefore, it makes sense that tools and household appliances in particular are of high quality. Companies that donate things to the library ensure that members try out a particular product from their brand for the first time. If they later want to buy such a product, in the case of a positive experience, they are more likely to choose the brand of the tested company over the competitor (Knjižnica REČI, 2015).

The LoT handles lost or damaged goods by asking the member to “replace it with a comparable or (at least partially) replace the cost of the [object], up to half of the estimated value of the object” (Knjižnica REČI, n.d.).

Value Delivery

This LoT offers all four **value propositions** in the framework: reduction in transaction costs, knowledge and cultural exchange, saving space and money, and “try before you buy.” The LoT allows online reservations through MyTurn software (**lending system**), which can be picked up during the **opening hours** offered three times per week (nine hours in total). No **alternative exchange** options (i.e., delivery or self-service pickup) are offered. The municipality provides the **space** for the LoT in an underutilized community center, as part of a neighborhood revitalization project (Cvetko, 2014). The LoT has requested that sponsors provide materials to outfit the space, such as “building materials, furniture, office and technical equipment” (Cvetko, 2014). It operates at the local level with only one location (**geographical scale**).

The LoT appears to use the **staffing** mix of program manager(s) and volunteers. While their website is not explicit about the number of paid staff and whether they are full- or part-time status, the LoT’s sponsorship request document (Cvetko, 2014) and guidebook for establishing LoTs (Knjižnica REČI, 2015) both indicate that the LoT hires paid staff to some extent. They also supplement with volunteers. Volunteer tasks include repairing items, library database administration, and communication.

Value Capture

Knjižnica REČI offers a paid all-access membership and a pay-as-you-go option (**membership model**) (Knjižnica REČI, n.d.). The all-access membership option is a one-year **time commitment** and offers three payment methods, including two bartering alternatives. When an individual first joins, they can either pay €20, donate an item from the wishlist, or contribute 30 hours of volunteer work to gain membership. Subsequent renewals cost €15. The LoT offers a concession membership rate of €5 for the unemployed (proof required). With the all-access membership, members can borrow one item at a time for one week at no cost. Any additional items cost €1 and extensions beyond the one-week period cost €1 per extra day. Alternatively,

the pay-as-you-go option has no **time commitment** and the weekly loan fees per item cost €2 to €5.

The LoT also offers some options for companies that blend the membership and funding models. In requesting financial support from companies, the LoT offers two options: 1) an honorary membership for contributions of at least €500 and 2) for a donation of at least €60, the company gets a one-year all-access membership (Cvetko, 2014). With the honorary membership, the company receives a 10-year membership, company recognition on the supporter board displayed in the LoT, and publication of the company logo in printed materials and the LoT's website.

In addition to financial funding via company memberships, the LoT receives other forms of support and **funding**. It has received monetary funding at the regional level from the European Union through the European Regional Development Fund (Cvetko, 2014). At the local government level, it has also received in-kind funding via provision of space from the Municipality of Ljubljana. The LoT also solicits in-kind inventory donations from companies. In return, the LoT suggests that companies will benefit by users gaining experience with the product through “try before you buy” loans, through recognition on the support board displayed in the LoT, and publication of the logo on the LoT's website. The LoT's website lists some current supporters, such as a company selling sewing equipment and one selling medical equipment. The website does not specify how these companies contribute (i.e., monetarily and/or in-kind inventory donations), though it seems that they may donate inventory given that some company names align with items in the inventory catalogue.

The **other revenue** collected by the LoT includes late fees and deposits. Late fees are charged at a rate of €2 per missed day. Deposits are charged for more expensive items regardless of membership type (i.e., hybrid or pay-as-you-go). For example, there is a €30 deposit for the sewing machine.

The LoT possesses non-pecuniary motivations for ownership of goods through its status as a non-profit entity and its non-economic value orientations. It leverages idling capacity of an existing stock of goods to the extent that members donate used goods to the LoT (**sustainability performance**). The LoT does not produce any **impact reporting**.

4.5.4 Scaling Paid LoTs

This archetype was not common, but the BM configuration was so distinct that it warranted a separate archetype. This archetype is based on Library of Things Ltd. (London, UK). This LoT started as a 3-month experiment in 2014, moved to a shipping container trial in 2016, then moved to a community hub model with multiple locations starting in 2018 (Library of Things Ltd., n.d.-c). It recently announced a franchising model aiming to expand to 50 locations across the UK by 2024 (Ethex, 2022). It also charges higher loan fees than other LoTs and has a legal form that allows profit. This archetype offers an example of what scaling one LoT organization could look like (i.e., as opposed to scaling the LoT concept through other methods, such as knowledge-sharing). Table 4-8 displays the dominant configuration options for this archetype.

Business Model Framework	Dominant Configuration
Marketplace Type	Business-to-Consumer
Governance Model	Formal
Inventory Management: Content	Narrow range
Inventory Management: Sourcing	Provided new through corporate partnerships
Venue for Interaction: Physical Space	Donated from community centers
Venue for Interaction: Opening Hours	33 to 65 hours/week
Venue for Interaction: Lending System	Other (proprietary software)
Venue for Interaction: Alternative Pickup	Self-service
Geographical Scale	Nodes
Staffing	Primarily run by paid staff
Membership Model	Pay-as-you-go
Funding Model	Significant and varied funding types and sources
Impact Reporting	Item-level reporting

Table 4-8 Dominant BM Configurations for Scaling Paid LoTs

Value Creation

The LoT's **key activities** are providing short-term access to under-utilized goods, sharing consumables, and sharing knowledge and skills. It handles consumables by including a certain quantity of the consumable in the loan fee, then providing extras for an additional fee. For example, its carpet cleaner requires cleaning tablets. Four cleaning tablets are included with the rental fee of £19.50 (€23) per day, but the user can purchase additional bags of cleaning tablets for £2 each if needed (Library of Things Ltd., n.d.-b). It operates as a B2C **marketplace** with a formal **governance model**. The LoT reflects all three **value orientations**: societal, social, and environmental.

The LoT manages a narrow **inventory** range of 50 different items. In 2016-2017, the LoT used a “shipping container testbed” to trial 400 different items to see which were best for borrowing (Library of Things Ltd., n.d.-c), then subsequently narrowed their range. Baden et al. (2020) interviewed Library of Things Ltd. (London, UK) as part of their study, where the LoT noted that the wide inventory range that they trialed was time-consuming and it would be more efficient and financially sustainable to narrow the inventory offerings. The LoT sources its inventory at zero cost from partner companies including Bosch and STIHL, as discussed in Section 4.2.5. In return, the LoT provides these companies with insights relevant to their circular economy strategies, such as usage statistics and opportunities to improve design and repairability of their products (e.g., if a certain part of the carpet cleaner breaks frequently and is difficult to repair) (Ethex, 2022).

Value Delivery

The LoT's **value propositions** include reduction in transaction costs, knowledge and cultural exchange (via “skillshare sessions”), and saving space and money. The item exchanges take place in seven community hub locations in London as of March 2022, but the LoT has an expansion plan for franchising outside of London. Thus, it operates under the nodes **geographical scale**, with interested parties applying to open additional locations. It has a goal to expand to 50 locations in the UK by 2024 (Ethex, 2022).

The LoT operates using a self-service kiosk system in existing community hubs (**venue for interaction**), and thus has long **opening hours** matching that of the community hub (33 to 65 hours per week, depending on the location). The reservation and kiosk system use the LoT’s proprietary software. When choosing community spaces, the LoT follows a criteria document for **space** requirements, requiring qualities such as high foot traffic and at least six opening days per week (see Section 4.3.2). The LoT has a team of over 20 **paid staff** and is hiring for additional positions (Library of Things Ltd., n.d.-g). They employ a mix of full- and part-time staff. The LoT sources new items for its inventory, thus it does not meet the “existing goods” **sustainability performance** metric. It does possess a non-pecuniary motivation to some extent, though this may change considering its future growth and profit forecasts.

Value Capture

This LoT uses a pay-as-you-go **membership model**. Members pay £1 to join, then otherwise pay loan fees for each borrowing (Gill, 2022a). There is no time commitment for the membership, thus it is effectively a lifetime membership once the initial £1 is paid. The daily loan fees range from £1.50 (€1.78) to £20 (€23.78) (Library of Things Ltd., n.d.-a), which is considerably higher than the other LoTs reviewed. They offer a concession membership with a 25% discount on loan fees (Gill, 2022a). To get this membership, the LoT asks why it is needed for their own tracking purposes, but they do not require proof. The LoT reports that item rentals earn less than £25,000 per year per site (Ethex, 2022).

The LoT has received considerable **funding** from various sources, summarized in Table 4-9. Overall, it plans to become financially self-sufficient by 2024 through its new franchising model, then start turning a profit in subsequent years (Ethex, 2022). By 2024, it aims to have 50 locations across the UK. Over 400 groups have already expressed interest in opening a site. The LoT believes that franchising will allow them to scale their concept faster, at a lower cost, and at a higher earning potential. To achieve this franchising model, the LoT aims to raise £1 million (€1.2 million), which it will use for technology (£550k or €654k), training franchisees (£200k or €238k), and for staff to deliver the roll-out (£250k or €297k). It has raised over £300k (€357k) in crowdfunding so far (Ethex, 2022).

Type	Funding Obtained
Monetary	Over £300k (€357k) raised through crowdfunding campaigns.
	£40k (€47k) of start-up fees from a council or "anchor institution" for each site
	Grant funding and impact investments
In-kind	Free inventory from Bosch Power Tools, Kärcher New Venture, and STIHL
	Free space for kiosks in existing community spaces
	Sponsored storage unit from Big Yellow Self-Storage West Norwood

Table 4-9 Summary of Library of Things Ltd. (London, UK)'s Funding (Baden et al., 2020; Ethex, 2022; Library of Things Ltd., n.d.-f)

With this franchising model, the LoT will collect franchising fees (**other revenue**). The franchisee will retain the majority of the loan fees, while Library of Things Ltd. (London, UK) will receive a minority (Library of Things Ltd., 2022b). Otherwise, the only **other revenue** sources identified were late fees and cleaning fees. Late fees are considerably higher than the other LoTs reviewed, at 1.5 times the daily loan fee for each day the item is late (Gill, 2022b).

The LoT does not produce a separate **impact report**, but does provide some LoT-level statistics, such as: number of borrowers, number of rentals, financial savings for borrowers, avoided emissions, waste prevention, and local jobs created (Library of Things Ltd., n.d.-i). It

also provides item-level information on storage space saved, financial savings for users, and waste avoided. For instance, for a drill, they state that this saves 0.158m² of space, costs £145 (€172) less to borrow than purchasing at retail price, and saves 1.5 kg of waste from landfill (Library of Things Ltd., n.d.-d). It also accumulates these savings in the member's account so that they can track their impact from borrowing over buying.

5 Discussion

This section will reflect on the findings of this research in the context of the literature reviewed and methods used. First, the findings are discussed against the literature, to compare empirical data collected against theory. Second, implications of the research design and methods are considered, with commentary on how the results should be interpreted.

5.1 Overview of the findings and their significance

5.1.1 Comparing the Proposed and Final Frameworks

Through this research, a proposed LoT BM framework based on theory was tested and refined through empirical data collection and analysis. The proposed framework served as a comprehensive and structured tool to describe LoT BMs and to assess which components of sharing economy BM frameworks from previous literature are applicable to LoTs. Ninety LoTs across North America, Europe, and Australia were mapped against the framework to create an empirical database.

As data was collected, new codes were abductively added to the framework. At the same time, some codes from the proposed framework were either 1) not observed in practice (e.g., the existing community geographical scale), 2) relatively unimportant for LoTs (e.g., review systems), or 3) difficult to map using publicly available information. Regarding the last point, the funding model was reorganized for this reason. While it would be valuable to track funding at the granular level proposed, LoT websites often do not specify what each partner provides (e.g., space vs. monetary funding). Thus, the funding model in the final framework was visualized as options that could be combined in a “mix and match” format based on the LoT’s needs and local context.

The empirical database was analyzed to determine a meaningful final framework for LoTs, presented in Sections 4.1 to 4.4. The final framework deviates from the morphological schema used in the proposed framework for two main reasons. First, the morphological schema allows for three dimensions: value type, attribute, and configuration options; however, I observed cases that warranted more than the three dimension to capture sufficient detail for LoT BMs. For example, inventory management and the funding model. Second, the morphological approach restricts to binary options. For some LoT BM areas, non-binary options were important to capture the nuances of LoT BMs. For instance, governance model is displayed as a spectrum and some fields capture numeric values (e.g., opening hours).

5.1.2 LoTs in the Context of Other Sharing Organizations

In the literature, Ameli (2017) defines LoTs as a PSS. Similarly, Curtis (2021) notes that sharing economy organizations may be an example of use-oriented PSS, as they facilitate access over ownership of goods. However, in one background interview, it was noted that LoTs distinguish themselves from other sharing models, such as rental shops, primarily based on value orientation [R1].

The empirical evidence obtained indicates that LoTs distance themselves from rental shops or PSS, with two main themes emerging. **First**, they are typically organized as non-profits or social enterprises (e.g., CIC in the UK) and do not have a commercial value orientation. Rather, they are driven by societal, social, and/or environmental values, often seeing themselves as part of a wider movement to change economic behaviors and reduce waste. Many use the term “borrow” instead of “rent” when discussing goods-sharing, reflecting the emphasis on community over profits. The membership and funding models also come together to provide the service at a low and accessible price. Many further enhance accessibility by providing concession pricing so that

no community members are excluded. **Second**, LoTs distinguish themselves by the types and range of goods they share (Section 4.2.5). They tend to stock a wider range of goods than rental shops would carry. This diverse range of goods also reflects the creative inventory sourcing employed by LoTs, often relying in part or entirely on donations from the community. LoTs may be strategic about distinguishing themselves from markets already served, instead seeking to fill a niche of sharing items that cannot be found in rental shops.

5.1.3 Tensions & Tradeoffs between Business Model Choices and Sustainability

The literature on LoTs, and social enterprises more broadly, highlights many complexities and tradeoffs when structuring LoT BMs. Limited resources (funding, space, inventory, and staff time) can make it difficult for LoTs to deliver their services. Given the social values of LoTs, it is important to remain accessible and research indicates that LoT prices must be low for users to engage (Ameli, 2017). As a result, LoTs need to navigate a number of tradeoffs between their limited resources, their level of service, and their sustainability performance. The following sections will highlight key challenges for users and/or LoT providers encountered through the literature or empirical data collected. Where possible, solutions encountered through the empirical data will be presented, along with potential tradeoffs for LoTs to be aware of.

Inventory Sourcing

Literature indicates that LoT users want access to a wide range of high-quality goods but are more willing to donate low-quality items toward the end of their useful lives (Ameli, 2017; Baden et al., 2020). Inventory donations play a major role for many LoTs, with some stocked exclusively through donations. This can help LoTs to build their inventory with little to no budget. However, reliance on donations can result in a mismatch of type and quality of goods the community wants compared to what they are willing to donate. Aside from the service impacts of low-quality donations, more staff time is required to maintain and repair the items.

To address the mismatch between type of inventory donated and the inventory the community wants, a few solutions were seen in practice. Many LoTs use a wish list to guide inventory donations, and some will only accept items from this list. Many impose further restrictions on the items they will take, such as requiring availability of spare parts, which ensures the LoT will realistically be able to maintain the item. Some LoTs also reserve the right to sell inventory that is not a good fit for the LoT. This can provide additional funds for the LoT and free up valuable space for other items, but takes staff time away from other LoT functions. It also conflicts with Curtis' (2021) sustainability criteria of facilitating access over ownership.

To address the quality of donations, LoTs may accept temporary donations, where the donor retains ultimate ownership of the item. This was proposed by Ameli (2017) and was seen in practice for six LoTs. Temporary donations could increase willingness to donate high-quality or expensive items. An interview with one LoT indicated that most donors ultimately do not take their item back, leaving it with the LoT permanently [R3]. This option can improve inventory quality, though may result in a slight administrative burden for the staff.

LoTs may prefer to source goods through donations or second-hand purchases, motivated by environmental sustainability and/or limited funding. Sharing *existing* items was a sustainability criterion identified by Curtis and Mont (2020) to counter rebound effects. However, in practice, this can limit the LoT's inventory offering by delaying inventory acquisition until a suitable option can be sourced through donation or second-hand purchase. It can also consume scarce staff time to search for inventory this way. The limited inventory and/or perceived low-quality of used inventory has the potential to alienate prospective members, thus limiting membership.

Thus, it could be possible that strategically selected new inventory could improve the inventory offering, attracting more members, and in turn reducing overall consumption by engaging more people in the sharing community.

To the extent the LoT has sufficient funds to purchase inventory, they may create green procurement criteria to guide their purchases. This may include a combination of second-hand purchases where possible, but also new purchases for hard-to-find items or for items that require more maintenance. For items they purchase new, LoTs could employ a criteria document like CML, where they consider other sustainability principles. For example, linkage to SDGs, educational programming, purchase from preferred business types (e.g., local businesses), and considering end-of-life disposal options.

In addition to the above, and especially in cases where funding is limited, LoTs may partner with companies or other organizations to source inventory for free or at a discount (Section 4.2.5). Companies may provide inventory for free in exchange for promoting their brand or for the LoT providing insights that are valuable to the company's circular economy. Benefits of this approach include receiving high-quality inventory that appeals to the community and saving staff time on maintenance. However, LoTs will need to assess whether this is conducive with their value orientation. For example, Leihothek received sponsored inventory from Wuddi, a car-sharing company, and wrote a blog post about Wuddi's services. While car sharing can be seen as environmentally sustainable to some extent (i.e., by reducing car ownership), the blog post promotes Wuddi over soft modes of transportation such as cycling in some cases. Thus, this could be perceived as a conflict with an environmental value orientation.

Perhaps one of the most promising examples of company inventory donations is La Manivelle Lausanne (Switzerland). This LoT received discontinued or display models from Makita, a Japanese tool company. This achieves Curtis' (2021) sustainability criteria of sharing existing goods that are also high-quality.

Venue for Interaction

Literature indicates that a convenient location is important to users, while LoTs may struggle to offer this due to a combination of high rent prices, limited or no funding, and a desire to keep prices low for members (Ameli, 2017). LoTs that operate in public-to-citizen format that are hosted in a traditional library benefit from a good location provided by the municipality, likely with more foot traffic and awareness. For B2C LoTs, they may also receive space from the municipality or private businesses. Beyond this, two potential solutions for B2C LoTs were identified through the empirical data collected.

First, LoTs may compensate for a poor location by offering delivery services. LoTs may be able to obtain a larger and/or cheaper storage space in a less desirable location, and still provide a convenient service to members by delivering. However, this results in a significant tradeoff with another area: LoT staffing. More staff or volunteer time is required to organize and execute deliveries. Second, some LoTs partnered with a host organization to receive free or reduced rent. Often, this was provided by the municipality, but it could also be provided by a local business or NGO.

Staffing

Literature indicates that LoT users value convenient and long opening hours, counseling and advice from staff during item exchanges, and want a wide range of high-quality items to borrow (Ameli, 2017; Baden et al., 2020). LoTs operating in a public-to-citizen format share paid staff from the library's overall pool of staff, and are seemingly able to provide long opening hours, educational programming in combination with the LoT, and perhaps have more resources to

maintain the items. Though, the latter depends on the LoT's staff structure and other staffing needs across library departments.

B2C LoTs often rely heavily on volunteers due to limited funding, which means they must be especially strategic with how they use staff and volunteer time. Limited staff and volunteers can mean limited opening hours, limited workshops, and less time to source and maintain inventory. In practice, three options were observed to help address this.

First, two LoTs offered self-service kiosks where users can pick up and return their items without staff present, greatly increasing opening hours with a fraction of the staff time. However, this comes with a tradeoff in the social dimension. Literature indicates users appreciate the personal connection and opportunity for counseling and advice when borrowing items (Ameli, 2017). Further, for LoTs that see themselves as providing a "cultural activity" (e.g., Leila-Bologna (Italy)) this method is likely not a desirable option.

Second, LoTs could secure paid staff to increase the service offering. This may be the case if an LoT operates as a project of another NGO, which has paid staff that can be shared with the LoT. The LoT could also receive staff through another initiative, such as the example of La Tatouthèque, which is staffed by participants in a youth work integration program through SemoNord. Alternatively, the LoT could secure specific funding to hire a project manager role or similar. For instance, Library of Stuff Mullumbimby (Australia) received funding for an Impact Amplifier position of ten hours per week for one year. While this option can help LoTs, it may be time-limited, as is the case in this example, and longer-term funding for staff would be desirable. It should also be noted that funding applications take time in the first place, so the process of securing funding can take time away from other LoT activities.

Third, the LoT may organize itself as a cooperative, where members are required to contribute time to the LoT in order to become a member. This can provide more resources to expand opening hours, maintain inventory, and perform other LoT tasks. It can also spread the workload rather than all activities falling on a smaller pool of volunteers. However, a cooperative governance model may be more difficult to manage as an LoT grows, requiring more coordination and training of members. Further, while a cooperative format where members contribute with time may provide access to those who have spare time but limited financial resources, the opposite can also be true. That is, some community members may wish to participate in the LoT, but do not have time to volunteer and are thus excluded.

Funding & Other Revenue

LoTs may turn to creative funding and other revenue sources to finance their operations while keeping costs low. However, some of these may create tension with other sustainability dimensions. As noted earlier, public recognition of companies for funding can incentivize donations, but conflict with environmental or societal value orientations. For instance, the LoT may appear to promote consumption at the donor company, conflicting with societal or environmental value orientations. There is also potential for social tension when LoTs promote donors, whether through logo display or by providing tiers of donation categories (e.g., gold, silver, bronze donors). To avoid this, Fritidsbanken (Sweden) displays all donor names on the same list with equal prominence and will not promote company logos on its website.

Another funding option observed was so-called "shop for good" donations, where platforms donate a percentage of sales to the organization selected. While this provides a new source of funding, it may again conflict with societal and environmental value orientations, by indirectly encouraging consumption. Individuals may feel that they are doing something good by

consuming because they are helping a good cause (i.e., the LoT), thus eroding overall consumption reductions from sharing (i.e., rebound effects).

Value Proposition

The previous sections often highlighted discrepancies between BM decisions and the LoT's value orientation. Another way this presented was through differences between the value proposition (i.e., why users engage with the LoT) and the LoT's value orientation. Ameli's (2017) research found that the environmental value of LoTs seemed "rather unimportant for the user" (p. 53300), which was echoed by one of the LoTs interviewed [R1]. R1's survey of its LoT members indicated they were more interested in saving money and space than the environmental benefits. From this, LoTs may wish to emphasize the space and monetary savings when communicating with prospective members to increase participation. To share knowledge about environmental or social values, LoTs can provide educational programming on these topics. This may have the added benefit of combatting rebound effects as well (Hofmann, 2019).

5.1.4 Financial Viability, Self-sufficiency, & Scaling

Social enterprise and sharing organization literature points to interest in financial *self-sufficiency* from both investors and practitioners (Baden et al., 2020; Martin et al., 2015; Ruggers & Schickner, 2017). For LoTs specifically, all six studied by Baden et al. (2020) were found to be "far from" financially self-sufficient. Self-sufficiency was also mentioned as a goal by one of the LoTs included in background interviews [R1] and by Library of Things Ltd. (London, UK). It should be noted that these LoTs (i.e. the six studied by Baden et al. (2020), R1, and Library of Things Ltd. (London, UK)) are all based in the UK, which may affect funding opportunities compared to other contexts, such as the EU. In contrast, other literature refers to financial *viability*, which recognizes that an organization may still be viable, through e.g., reliable long-term funding, use of volunteers, and inventory donations. Thus, one might question whether the goal for LoTs (and their investors) should be self-sufficiency or viability, especially in light of the important environmental and social contributions of LoTs.

The empirical findings of this research indicate that none of the 90 LoTs are financially self-sufficient today. In other words, all received some form of external funding (monetary and/or in-kind). However, the multitude of funding options (Section 4.4.2) and staffing mixes (Section 4.3.4) suggest many paths to financial *viability*. The Public-to-Citizen LoT and Community-Driven Free LoT archetypes both demonstrate financial viability. The former achieves this through long-term, reliable funding through the local government and other recurring funding. The latter achieves viability by keeping costs extremely low, through in-kind donations of inventory and/or space, and reliance on volunteers. For Community-Driven Paid LoTs, it is more difficult to comment on viability based on this research. This archetype relies on both direct revenue and outside funding, but the timeframes and reliability of the outside funding are not discernable from the documentation reviewed, and is thus an area for future research (Section 6.2). However, I suspect that many LoTs could use a combination of funding options from Section 4.4.2 to find a model that is viable for them. The empirical evidence indicates that there is a role for both public and private actors in supporting LoTs. In contexts where government support is lacking, there is potential to receive support from private actors. The Scaling Paid LoT archetype, represented by Library of Things Ltd. (London, UK), achieves viability today through a mix of direct revenue and substantial outside funding (e.g., crowdfunding, start-up fees for each site, free space in community hubs, free inventory, etc.). However, it plans to achieve financial self-sufficiency by 2024, then generating profit in subsequent years. It plans to achieve this by franchising to 50 locations across the UK by 2024.

Though the literature indicates interest in financial self-sufficiency, it also points to the risk of mission drift and a tendency toward commercial orientation when scaling up social enterprises.

There may be some risks and tradeoffs with the approach of the Scaling Paid LoT archetype. This LoT charges comparatively high loan fees and has a narrow range of only the most popular items, which may go against user wishes per previous research (Ameli, 2017). The use of self-service kiosks in community hubs addresses the desire for long opening hours and convenient locations mentioned by Ameli (2017), but also reduces the social element that users want.

Alternatives to scaling mentioned in the literature include alternative growth strategies. First, LoTs may diversify activities instead of growing the organization (European Commission & OECD, 2022). This was observed in practice, with many LoTs sharing knowledge and skills through programming, in addition to goods-sharing. Second, LoTs may choose to remain local, but encourage replication in other locations (European Commission & OECD, 2022). This was also observed in practice, with several LoTs publishing “starter guides” and through website messaging inviting interested parties to contact the LoT for knowledge-sharing and advice.

This research highlights that while literature and practitioners may aspire to financial self-sufficiency, it is not yet happening in practice for LoTs and there may be risks and tradeoffs to achieving it. Thus, financial viability may be worth pursuing instead. In this case, LoTs make use of a diverse range of in-kind and/or monetary funding to remain viable. In addition, increasing recognition of the contributions of social enterprises, such as LoTs, toward sustainable consumption will hopefully translate into more reliable public funding as well (e.g., as recognized by the EC’s SEAP).

5.2 Methodological Limitations

This section reflects on the suitability of the research design and factors that the reader should consider when interpreting results. This thesis aimed to improve understanding of LoT BMs to support their design and implementation. To achieve this aim, I examined the BM configurations of 90 LoTs to test and refine a framework for LoT BMs, to create an empirical database, and to derive four LoT archetypes. The research design started with a proposed LoT BM framework based on theory, background interviews, and my own practitioner experience. The framework was then tested and refined by abductively mapping 90 LoTs against the framework using secondary sources. This data was supplemented by targeted personal communications with LoT practitioners to better understand specific BM choices. I then analyzed the data for patterns to develop LoT archetypes.

This research started with a proposed LoT BM framework developed from the literature review. The core framework was based on Curtis’ (2021) sharing economy BM framework, with adjustments for other important LoT or social enterprise themes encountered in the literature. Curtis’ (2021) framework was developed based on literature (Curtis & Mont, 2020) and through empirical data on 63 sharing organizations. Thus, using this as a foundation provided a more thorough and tailored starting point than other frameworks, such as the BMC. Another framework that could have been relevant to incorporate is the Naturvation framework (Naturvation, n.d.). This was built for nature-based solutions but could be applicable to many social or environmental organizations. It defines not just the economic value, but also biophysical, social, and cultural value created. It also looks at *who* values each of these benefits (e.g., public or private actors, NGOs, and local communities) and therefore would be willing to pay for the value. Thus, it defines the “customer” more broadly than the LoT user. While this would be valuable for LoTs, it was scoped out of this research because it was determined to be a necessary and important first step to understand the LoT BM with the “traditional” customer (i.e., the LoT user) in mind. Future research could expand on this, looking at value created for other actors (Section 6.2).

When designing this research, I opted to use document review as my primary data collection method. By using publicly available documents, I was able to cover a far higher number of LoTs than other methods, such as selecting case studies and conducting interviews. This is important for the research aim to improve understanding of the current state of LoTs. Second, this method allowed me to pick up on nuances and configuration options that might have been missed with a method such as surveys. Reviewing the documentation allowed me to code abductively, allowing new configurations to be added as they emerged through empirical observation. Lastly, another advantage over surveys was a reduced language barrier. Some LoTs may not have felt comfortable responding to a survey in English, which may have reduced the response rate. By using publicly available information, with the aid of Google Translate, I was able to include more LoTs in my review.

Disadvantages of document review include incomplete information, challenges with translation, and potential subjectivity in coding the data. While many LoTs provided robust information on their websites, in some cases it was not possible to map all attributes for an LoT based on publicly available information. Translation also posed a challenge in some cases, for LoTs whose websites were in a language other than English. In these cases, Google Translate was used and provided sufficient translation of text on websites, but to the extent LoTs provided information in images, videos, and PDFs, these could not be translated.

The document review and coding process could have been improved by having a second researcher independently code the LoT data collected (Täuscher & Laudien, 2018), as some coding may be subjective in nature. Better still, a second researcher that spoke another language used by many LoTs (e.g., German) may have reduced gaps in data due to language barriers. However, this was not an option in an independent project such as this thesis. Future research in this area would benefit from input of other researchers in different contexts (Section 6.2).

The results of this thesis should be interpreted with these limitations in mind. The focus of the research was breadth over depth, with an aim to provide an overview of what LoT BM configurations exist today. The empirical database should not be interpreted as fully accurate for any given LoT because information may have been missed due to the language barrier, missing data, subjectivity of interpretation, changes since the data was originally collected, or because a code was added abductively in the middle of data collection. In particular, for the binary coding, it should be noted that a “0” could indicate that the BM configuration was not in use by the LoT, that the data was unavailable, or that the code was added abductively and previously mapped LoTs were not re-examined. Thus, caution should be used when interpreting any totals or averages for BM configurations, as some may be understated.

For the archetypes identified, it is possible that with additional methods, such as interviews, they could be further disaggregated. For example, R3 indicated LoTs can conceptualize their activities as a lending service or as a cultural activity, which was a new way of framing LoTs not encountered in the literature. This is difficult to discern based solely on publicly available information, however, this could be revealed through interviews, and thus could be an area for future research. Similarly, it is difficult to assess long-term financial viability based on secondary data, since it is static in nature and often does not disclose the timeline of the funding. This could also be an area for future research to disaggregate the archetypes developed in this thesis (Section 6.2).

Regarding generalizability, this research reviewed a large population of LoTs (90), representing several geographical contexts (North America, Europe, and Australia). However, as noted earlier, language limitations when searching for LoTs could mean that some were missed and certain geographic contexts were not represented in the population. While this research can

hopefully provide inspiration for BM design and implementation in a variety of contexts, the local market, cultural values, support from public and private actors, and other BM options available will vary. This should be considered when interpreting results and could be an opportunity for researchers in different contexts to explore in the future (Section 6.2).

6 Conclusions

The latest IPCC report stresses the urgency of action on climate change, including demand-side measures to reduce consumption (Creutzig et al., 2022). LoTs sit at the intersection of the sharing and social economies and can provide a path toward sustainable consumption with social well-being. They have the potential to overcome key sustainability and service shortcomings of other circular and sharing BMs, but research on LoTs is sparse. Because of this potential, this research set out to improve the understanding of LoT BMs to support their design and implementation. Two research questions were identified and answered through this thesis:

RQ1: *What business model configurations are libraries of things using today?*

This research tested and revised a BM framework for LoTs (Sections 4.1 to 4.4, Section 5.1.1). A proposed framework based on the literature was tested by collecting and analyzing empirical data for 90 LoTs. Based on this data, the framework was refined to include the configurations most relevant to LoTs, including new configurations that were added based on empirical data. Each framework option was described with illustrative examples from a variety of LoTs. These are significant contributions to research in the fields of the sharing economy, social economy, and LoTs. The framework builds on previous sharing and social economy research to disaggregate features that are of relevance for LoTs. It is also based on a larger population of LoTs than previous LoT BM research, thus providing significant empirical data. The framework and empirical database can both serve as foundations for future research on LoTs or related topics.

The findings for this RQ also contribute new knowledge and perspectives to the implications of LoT BM choices. First, this research discusses the distinction between LoTs and other sharing models and PSS (Section 5.1.2). Second, it highlights tensions between BM configuration choices for LoTs (Section 5.1.3). The literature highlighted tradeoffs stemming from resource constraints (e.g., limited staff, funding, and quality inventory) that can make it difficult for LoTs to deliver their services and achieve financial viability. Literature also highlighted that the sharing economy is not sustainable by default and outlined suggested sustainability performance indicators. This thesis corroborated many of the tradeoffs with empirical evidence, identified additional tradeoffs between BM choices, and identified solutions seen in practice.

Empirical data demonstrates that in addition to traditional revenue from the membership model, LoTs use a variety of creative funding options that could allow for financial viability, even if not self-sufficiency (Section 5.1.4). Funding sources include public, private, and individual actors and may include both monetary and in-kind funding. However, tensions remain, and a solution to one BM challenge may result in a tradeoff with another BM or sustainability dimension. Inventory sourcing, the venue for interaction, staffing choices, the funding model, other revenue, and the value proposition were specifically identified as BM dimensions with tensions or tradeoffs (Section 5.1.3).

RQ2: *What are the dominant archetypes of libraries of things?*

RQ2 was answered by deriving four LoT BM archetypes based on the empirical data collected: Public-to-Citizen LoTs, Community-Driven Free LoTs, Community-Driven Paid LoTs, and Scaling Paid LoTs (Section 4.5). The archetypes are differentiated based on themes that emerged from the literature and from the empirical data, including: inventory management, venue for interaction, staffing, membership model, funding model, marketplace type, value orientation, and geographical scale. For each archetype, one case LoT was selected and its BM framework

dimensions were described. These archetypes contribute to both knowledge and practice, advancing the design and implementation of LoT BMs.

6.1 Practical Implications and Recommendations

6.1.1 Practitioners

This research provides a comprehensive BM framework and empirical database that can support existing and prospective LoT practitioners to design, implement, and innovate with a BM that works in their context. The findings of this research provide descriptions of each BM configuration along with examples used by LoTs in practice. Practitioners can reference the empirical database for even more granular detail on how other LoTs have structured their BMs. There is no single path or “formula” to designing an LoT, but there are a multitude of options used in practice and four dominant archetypes identified in this research. Prospective practitioners can reference these archetypes to get an overview of LoT options available and what may work in their context. All practitioners can gain inspiration from how other LoTs have designed their BM to innovate with their own and to network with other LoTs. This research also highlights tensions and tradeoffs between sustainability and financial viability for LoTs to be aware of.

The membership and funding models outlined in the final framework may be of particular interest to practitioners, as there were many variations seen in practice. LoTs may consider adding multiple membership options to suit more customers and may consider alternatives to standard membership pricing, such as bartering, concession, and supporter memberships. The funding model presented in this research provides a number of non-monetary funding options for LoTs to consider that may support financial viability. With this in mind, LoT practitioners may also reflect on whether they want or need to aim for financial self-sufficiency versus financial viability.

6.1.2 Public & Private Actors

Public and private actors can use this research to better understand the key components, choices, and tradeoffs that LoTs face when designing their BM. Through sufficient, reliable, and long-term funding, policymakers can reduce tradeoffs that LoTs face regarding sustainability and financial viability. In light of the urgency for reducing consumption in line with the latest IPCC reports, policymakers should recognize the environmental and social benefits of LoTs in this regard and support them.

Public and private actors should streamline funding applications and take a long-term view. Funding applications take LoT staff time away from other core activities and may be restricted in nature. For instance, funders may restrict funding to special projects, while the LoT also needs funding for core operational and business development work, as noted by Library of Things Ltd. (London, UK). The EC’s SEAP shows promise in this regard, by streamlining all funding information in one place and by working to improve access to funding. While not directly assessed in this research, the literature also indicates that investors may only provide funding during the start-up stages, which pressures social enterprises to strive for self-sufficiency, carrying risks such as mission drift.

In addition to financial funding, public and private actors can consider in-kind funding, such as providing a desirable physical space (or spaces) for the LoT. To achieve maximum reach, the space should be convenient to community members, have high foot traffic, and provide sufficient space for the LoT to store and expand inventory. The host organization can also benefit from additional visits to the space. As indicated by Library of Things Ltd. (London,

UK), hosts benefit from an extra 5,000 visitors per year. Public and private actors can also consider funding or potential work programs that would allow the LoT to hire one or more paid staff members on a long-term basis to improve the service offering.

6.2 Recommendations for Future Research

This thesis has advanced knowledge of LoT BMs by creating a comprehensive LoT BM framework and empirical database based on review of 90 LoTs. It also contributes to both knowledge and practice by developing four LoT archetypes, aiding with BM implementation. The research has highlighted tensions and tradeoffs between BM choices, sustainability dimensions, and financial viability. LoTs should bear these tradeoffs in mind when designing and modifying their BM. Private and public actors that interact with LoTs can work to reduce these tensions and tradeoffs by improving access and terms of funding.

Through this thesis, many areas for future research were identified. Regarding breadth of the research, as noted in Section 5.2, this research could benefit from additional researcher input, especially from those in other geographical contexts. Similarly, researchers that speak languages other than English may identify additional LoTs and may be able to map and provide more detail on the LoTs from this study whose websites are in other languages. Another way to broaden the research could be to expand the scope to include other niche lending organizations, like tool or toy libraries. The framework in this research could serve as a baseline, to be expanded upon for specialty libraries, or could be modified to suit each type individually.

There are also many opportunities to use my research as a foundation for deeper research on specific BM aspects. First, while this research gives a baseline of funding options available, secondary sources did not yield as much information on the terms of the funding. For example, LoTs often list supporters on their websites, but do not always specify what exactly the supporter provides and the length of the funding. Thus, further research on funding through other methods, such as surveys or interviews, may yield additional insights on funding options and financial viability. Second, since the main value generated by LoTs is environmental or social, it could be argued that there are many “customers” beyond the LoT members. For instance, municipalities can link LoT values to their climate and waste management strategies, among others. Thus, future research could expand upon the value proposition dimension of this framework by including additional stakeholders and beneficiaries of LoTs, such as the public and private actors that interact with LoTs. This research could elaborate on why funders are supporting the organizations, which may affect the LoT’s value proposition, value orientation, and impact reporting. It could also better define the specific value generated, which could in turn help with LoT’s case for funding. Both of these future research areas could also help to further disaggregate the archetypes identified in this research.

Future research could also look at the LoT user to better understand their motivation for engaging with the LoT, thus giving more insight into the value proposition. The proposed LoT BM framework in this research included review systems, which was ultimately removed from the final framework as they did not appear to play a major role for LoTs based on the data collected. However, future research could perform sentiment analysis or other methods on LoT reviews from Google and other platforms. Such research could shed light on both positive and negative sentiments toward LoTs, what users like and dislike, which could inform LoT BM choices. Future research could also investigate whether item-level reviews affect the LoT user experience, and in what ways (e.g., does it improve trust in item quality?). Another angle to consider is item-level impact reporting. Only one LoT from this study included item-level impact reporting of waste, space, and costs avoided. Future research could investigate how this type of reporting impacts LoT user behavior (i.e., does it make them more likely to engage with LoTs or increase frequency of borrowing?) and whether it leads to any rebound effects.

It would also be beneficial for future research to expand on the sustainability dimension of LoTs. Inventory sourcing is a core part of the LoT BM and an area with the potential for many tensions between BM choices and sustainability. Thus, future research could further investigate and quantify the tradeoffs between LoTs acquiring inventory new or second-hand. It could also investigate which items have the most potential environmental and/or social benefits, based on qualities such as how frequently the item is typically used on an individual basis and the environmental impact at each lifecycle stage.

Bibliography

Ameli, N. (2017). Libraries of Things as a new form of sharing. Pushing the Sharing Economy. *The Design Journal*, 20(sup1), S3294–S3304. <https://doi.org/10.1080/14606925.2017.1352833>

American Library Association. (2016, July 15). *Become a Librarian*. <https://www.ala.org/educationcareers/libcareers/become>

Arabi, H., Berendsen, S., Cavalleri, S., Das, A., Espinoza, F., Huidobro, C., Laroche, V., Litjens, S., Matrai, I., Nygård, T., Pipkin, B., Reznikova, T., Valencia, A., & Varga, D. (2018). *Dare to repair: Exploring open repair to keep critical materials in the loop*. <https://lup.lub.lu.se/luur/download?func=downloadFile&recordId=8969158&fileId=8969176>

Baden, D., Peattie, K., & Oke, A. (2020). Access over ownership: Case studies of libraries of things. *Sustainability (Switzerland)*, 12(17). Scopus. <https://doi.org/10.3390/su12177180>

Banff Public Library. (n.d.). *Library of Things*. Retrieved February 11, 2022, from <https://www.banfflibrary.ab.ca/Library-Services/Additional-Services/Library-of-Things>

Beaverton City Library. (n.d.). *Library of Things*. Retrieved April 15, 2022, from <https://www.beavertonlibrary.org/377/Library-of-Things>

bib der dinge Bochum. (n.d.). *FAQ – bib der dinge Bochum*. Retrieved March 15, 2022, from <https://bib-der-dinge-bochum.de/faq/>

Bocken, N. M. P., de Pauw, I., Bakker, C., & van der Grinten, B. (2016). Product design and business model strategies for a circular economy. *Journal of Industrial and Production Engineering*, 33(5), 308–320. <https://doi.org/10.1080/21681015.2016.1172124>

Bocken, N. M. P., Short, S. W., Rana, P., & Evans, S. (2014). A literature and practice review to develop sustainable business model archetypes. *Journal of Cleaner Production*, 65, 42–56. <https://doi.org/10.1016/j.jclepro.2013.11.039>

Cary Library. (n.d.). *Library of Things*. Cary Library. Retrieved March 3, 2022, from <https://www.carylibrary.org/library-things>

Circle Centre. (n.d.). *Educational Events*. Circle Centre Lund. Retrieved April 20, 2022, from <https://www.circlecentrelund.org/events>

Corbin, J. M., & Strauss, A. (1990). Grounded theory research: Procedures, canons, and evaluative criteria. *Qualitative Sociology*, 13(1), 3–21.

Creswell, J. W., & Creswell, D. J. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th Edition). SAGE.

Creutzig, F., J. Roy, P. Devine-Wright, J. Díaz-José, F.W. Geels, A. Grubler, N. Maïzi, E. Masanet, Y. Mulugetta, C.D. Onyige, P.E. Perkins, A. Sanches-Pereira, E.U. Weber, 2022: Demand, services and social aspects of mitigation. In IPCC, 2022: Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [P.R. Shukla, J. Skea, R. Slade, A. Al Khourdajie, R. van Diemen, D. McCollum, M. Pathak, S. Some, P. Vyas, R. Fradera, M.

Belkacemi, A. Hasija, G. Lisboa, S. Luz, J. Malley, (eds.]. Cambridge University Press, Cambridge, UK and New York, NY, USA. doi: 10.1017/9781009157926.007

Curtis Memorial Library. (n.d.-a). *About CML*. Curtis Memorial Library. Retrieved April 22, 2022, from <https://curtislibrary.com/about/>

Curtis Memorial Library. (n.d.-b). *CML Library of Things*. Retrieved May 17, 2022, from <https://curtislibrarylibraryofthings.myturn.com/library/inventory/browse>

Curtis Memorial Library. (n.d.-c). *CML Library of Things Wishlist*. SoKind Registry. Retrieved April 22, 2022, from <https://sokindregistry.org/registry/9607>

Curtis Memorial Library. (n.d.-d). *Is the item a good fit for our Library of Things*. Retrieved March 28, 2022, from <https://curtislibrary-my.sharepoint.com/:x/p/honsrud/ESBmUp6aG2pIhMIc2BFAPMkBfMMCupjWYizaftPK5rg4dg?rttime=KtaYW8MQ2kg>

Curtis Memorial Library. (2021, December 21). *Lending Beyond Books*. <https://vimeo.com/659156670>

Curtis, S. K. (2021). Business model patterns in the sharing economy. *Sustainable Production and Consumption*, 27, 1650–1671. <https://doi.org/10.1016/j.spc.2021.04.009>

Curtis, S. K., & Mont, O. (2020). Sharing economy business models for sustainability. *Journal of Cleaner Production*, 266, 121519. <https://doi.org/10.1016/j.jclepro.2020.121519>

Cvetko, M. (2014). *Sponzorji [Sponsors]*. <https://knjiznicareci.si/wp-content/uploads/2015/01/sponzorji.pdf>

Denver Public Library. (n.d.). *Denver Public Library Catalogue*. Retrieved March 4, 2022, from https://catalog.denverlibrary.org/search/searchresults.aspx?ctx=1.1033.0.0.6&type=Keyword&term=2246667&by=CN&sort=RELEVANCE&limit=TOM=*&query=&page=0&searchid=1

Dover Town Library. (n.d.). *Unique Objects*. Retrieved March 15, 2022, from <http://dovertownlibrary.org/unique-objects-2/>

Dover Town Library. (2017). *Dover Town Library Long Range Plan 2018-2023*. <http://dovertownlibrary.org/wp-content/uploads/2018/02/DTL-Long-Range-Plan-Final-Approved3.pdf>

Druckman, A., Chitnis, M., Sorrell, S., & Jackson, T. (2011). Missing carbon reductions? Exploring rebound and backfire effects in UK households. *Energy Policy*, 39(6), 3572–3581.

Elmhurst Public Library. (n.d.). *Fine Free FAQ*. Elmhurst Public Library. Retrieved March 4, 2022, from <https://elmhurstpubliclibrary.org/about-us/library-cards/fine-free-faq/>

Ethex. (2022, March 15). *Cuppa Club 26- Library of Things and Stroud Micro Dairy*. <https://www.youtube.com/watch?v=11aBoHZZHc8>

European Commission. (n.d.). *Social Enterprises*. Retrieved December 7, 2021, from https://ec.europa.eu/growth/sectors/social-economy-eu/social-enterprises_en

European Commission. (2021, December 9). *Commission presents Action Plan to boost the social economy and create jobs*. <https://ec.europa.eu/social/main.jsp?langId=en&catId=89&newsId=10117&furtherNews=yes#navItem-1>

European Commission, & OECD. (2022). *Policy brief on making the most of the social economy's contribution to the circular economy* (OECD Local Economic and Employment Development (LEED) Working Papers No. 2022/01; OECD Local Economic and Employment Development (LEED) Working Papers, Vol. 2022/01). <https://doi.org/10.1787/e9eea313-en>

Fritidsbanken. (n.d.-a). *Hitta din Fritidsbank*. Retrieved March 15, 2022, from <https://www.fritidsbanken.se/hitta-din-fritidsbank/>

Fritidsbanken. (n.d.-b). *Så här går det till [This is how it works]*. Retrieved March 15, 2022, from <https://www.fritidsbanken.se/sa-har-gar-det-till/>

Gibson-Graham, J. K., Cameron, J., & Healy, S. (2013). *Take Back the Economy: An Ethical Guide for Transforming Our Communities*. U of Minnesota Press.

Gill, B. (2022a). *Membership and new borrower FAQs*. Library of Things. <https://libraryofthingshelp.zendesk.com/hc/en-gb/articles/4411342613393-Membership-and-new-borrower-FAQs>

Gill, B. (2022b, April 14). *Late fees and cleaning charges*. Library of Things. <https://libraryofthingshelp.zendesk.com/hc/en-gb/articles/4411292975633-Late-fees-and-cleaning-charges>

Hastings Library of Things. (n.d.). *Hastings Library of Things*. Retrieved April 21, 2022, from <https://hastingslot.myturn.com/library/>

Heart of Hastings CLT. (n.d.). *Hastings Library of Things*. Retrieved February 16, 2022, from <https://heartofhastings.org.uk/hlot/>

Heinerleih. (n.d.). *UNTERSTÜTZEN [Support]*. Retrieved February 15, 2022, from <https://www.heinerleih.de/geldspende/>

Hillsboro Public Library. (2016, December 28). *Library of Things – Chimney Brush Kit*. https://www.youtube.com/watch?v=89t_klQuEK0

Hofmann, F. (2019). Circular business models: Business approach as driver or obstructer of sustainability transitions? *Journal of Cleaner Production*, 224, 361–374. <https://doi.org/10.1016/j.jclepro.2019.03.115>

Library of Stuff CIC. (n.d.). *About*. Retrieved April 21, 2022, from <https://libraryofstuff.co.uk/index.php/team>

IPCC. (2022, April 4). *The evidence is clear: The time for action is now. We can halve emissions by 2030*. <https://www.ipcc.ch/2022/04/04/ipcc-ar6-wgiii-pressrelease/>

Knjižnica REČI. (n.d.). *Postani član [Become a member]*. Retrieved April 18, 2022, from <https://knjiznicareci.si/sodeluj/>

Knjižnica REČI. (2015). *Priročnik vzpostavitve Knjižnice REČI [Manual for the Establishment of Knjižnice REČI]*. https://knjiznicareci.si/wp-content/uploads/2015/02/KR_prirocnik_kon%C4%8Dni-priro%C4%8Dnik.pdf

Knjižnica REČI. (2022). *Poziv Knjižnica REČI+TI [Call Knjižnica REČI+YOU]*. <https://knjiznicareci.si/poziv-knjiznica-reciti/>

KW Library of Things. (n.d.-a). *Frequently Asked Questions (FAQ)*. Retrieved February 11, 2022, from <http://kwlot.ca/faq/>

KW Library of Things. (n.d.-b). *Mobile-LOT-FAQ*. Retrieved April 22, 2022, from http://kwlot.ca/wp-content/uploads/2021/06/Mobile-LOT-FAQ_final.docx.pdf

La Manivelle Geneva. (n.d.-a). *Get Involved*. Retrieved February 18, 2022, from <https://www.manivelle.ch/en/entreprises>

La Manivelle Geneva. (n.d.-b). *Taxe de retard [Late fee]*. Retrieved February 18, 2022, from <https://www.manivelle.ch/en/taxe-de-retard>

La Manivelle Lausanne. (n.d.-a). *Inventory*. Retrieved April 21, 2022, from <https://lausannemanivelle.myturn.com/library/inventory/browse?q=makita>

La Manivelle Lausanne. (n.d.-b). *Partenariats [Partnerships]*. Retrieved February 18, 2022, from <https://lausanne.manivelle.ch/partenariats/>

La Manivelle Nyon. (n.d.). *La Manivelle Nyon*. La Manivelle Nyon. Retrieved February 19, 2022, from <https://nyon.manivelle.ch/>

La Tatouthèque. (n.d.). *La Tatouthèque*. Tatouthèque. Retrieved February 19, 2022, from <https://www.tatoutheque.ch/tatoutheque-yverdon/>

La Trucothèque. (n.d.). *La Trucothèque*. Retrieved February 21, 2022, from <https://latrucotheque.myturn.com/library/>

Lax, B. (2020). What Are These Things Doing in the Library? How a Library of Things Can Engage and Delight a Community. *OLA Quarterly*, 26(1), 54–61. <https://doi.org/10.5399/osu/1093-7374.26.01.11>

Leanstack. (n.d.). *Lean Canvas*. Retrieved December 12, 2021, from <https://leanstack.com/lean-canvas>

Leihbar Bonn. (2021, January 30). *Allgemeine Leihbedingungen [Loan Conditions]*. <https://leihbarbonn.de/en/allgemeine-leihbedingungen/>

LeihBARaque. (n.d.-a). *Leihbaraque Murten*. Leihbaraque. Retrieved February 21, 2022, from <https://www.leihbaraque.ch>

LeihBARaque. (n.d.-b). *Unsere Vision [Our Vision]*. Leihbaraque. Retrieved February 21, 2022, from <https://www.leihbaraque.ch/vision>

Leihladen Bochum. (2018). *Allgemeine-Leihbedingungen [General Rental Conditions]*. <https://www.leihladen-bochum.de/wp-content/uploads/2018/06/Allgemeine-Leihbedingungen.pdf>

- Leihlager. (n.d.). *Leihlager*. Retrieved February 24, 2022, from <https://leihlager.ch/en/>
- Leihlager. (2021, January 27). *FAQs*. <https://leihlager.ch/en/faqs/>
- Leihothek. (n.d.-a). *2 wasserdichte Fahrradtaschen—Gesponsort von wuddi [2 waterproof bike panniers—Sponsored by wuddi]*. Retrieved February 15, 2021, from <https://leihothek.de/catalog/muenster/articles/208/2-wasserdichte-fahrradtaschen-gesponsort-von-wuddi>
- Leihothek. (n.d.-b). *Leihothek*. Retrieved April 21, 2022, from <https://leihothek.de/>
- Leihothek. (2021, July 2). *So richtig smart: Wuddi—Carsharing in Münster [Really smart: Wuddi—Car sharing in Münster]*. <https://leihothek.de/blog/post/12/so-richtig-smart-wuddi---carsharing-in-muenster>
- Leila Berlin. (n.d.-a). *Besuch uns! [Visit us!]*. Retrieved February 15, 2022, from <http://leila-berlin.de/besuch-uns/>
- Leila Berlin. (n.d.-b). *Gründe einen Leihladen! [Start a loan shop!]*. Retrieved April 21, 2022, from <http://leila-berlin.de/leilaidee-teilen/>
- Leila Berlin. (n.d.-c). *Leihregeln [Rental Rules]*. Retrieved February 15, 2022, from <http://leila-berlin.de/leihregeln/>
- Leila Berlin. (n.d.-d). *Termine [Events]*. Retrieved February 15, 2022, from <http://leila-berlin.de/termine/>
- Leila-Bologna. (n.d.). *Come Funziona [How does it work]*. Leila Bologna. Retrieved February 16, 2022, from <https://leila-bologna.it/regolamento/>
- Lend Engine. (n.d.). *Contact Us*. Retrieved April 21, 2022, from <https://www.lend-engine.com/contact>
- Library of Stuff CIC. (2021). *18 Month—Impact Report*. 19.
- Library of Stuff Mullumbimby. (2021). *Impact Report*. <https://libraryofstuff.org.au/wp-content/uploads/Final-Library-of-stuff-Impact-Report-2021.pdf>
- Library of Things Ltd. (n.d.-a). *Browse the Things*. Retrieved April 24, 2022, from <https://www.libraryofthings.co.uk/catalogue/browse>
- Library of Things Ltd. (n.d.-b). *Carpet Cleaner*. Retrieved April 24, 2022, from <https://www.libraryofthings.co.uk/catalogue/borrow-carpet-cleaner>
- Library of Things Ltd. (n.d.-c). *Crowdfund*. Retrieved March 15, 2022, from <https://www.libraryofthings.co.uk/crowdfund>
- Library of Things Ltd. (n.d.-d). *Drill (cordless)*. Retrieved April 22, 2022, from <https://www.libraryofthings.co.uk/catalogue/borrow-drill-cordless>
- Library of Things Ltd. (n.d.-e). *Library of Things Terms of Borrowing*. Retrieved April 15, 2022, from <https://www.libraryofthings.co.uk/terms-of-borrowing>

Library of Things Ltd. (n.d.-f). *Partners*. Retrieved April 14, 2022, from <https://www.libraryofthings.co.uk/partners>

Library of Things Ltd. (n.d.-g). *Team*. Retrieved February 27, 2022, from <https://www.libraryofthings.co.uk/team>

Library of Things Ltd. (n.d.-h). *Thing Technician*. Retrieved May 17, 2022, from https://libraryofthings-files.s3.eu-west-2.amazonaws.com/Open_Thing_Tech_JD_3.pdf

Library of Things Ltd. (n.d.-i). *Why Library of Things*. Retrieved April 24, 2022, from <https://www.libraryofthings.co.uk/why>

Library of Things Ltd. (2019, June 6). So, are you a business or a charity? *Library of Things*. <https://content.libraryofthings.co.uk/blog-2/profit-with-purpose>

Library of Things Ltd. (2022a). *Criteria for spaces*. https://drive.google.com/file/d/18VytX5S3OtNzBeI3lz09sKg3GFRuzLTG/view?usp=embed_facebook

Library of Things Ltd. (2022b). *Proposal for Local Partners*. https://drive.google.com/file/d/17cjVTpfVZJkyn2w9WrwunNI20le--w_V/view?usp=embed_facebook

Library of Things Prague. (2017, May 29). *Library of Things Prague*. <https://www.facebook.com/libraryofthingsprague/posts/1624951444214128>

Library of Things YXE. (n.d.). *Library of Things YXE*. Retrieved February 13, 2022, from <https://libraryofthingsyxe.myturn.com/library/>

Martin, C. J., Upham, P., & Budd, L. (2015). Commercial orientation in grassroots social innovation: Insights from the sharing economy. *Ecological Economics*, 118, 240–251. <https://doi.org/10.1016/j.ecolecon.2015.08.001>

Mesa Public Library. (n.d.). *Stuffbrary*. Retrieved March 7, 2022, from <https://www.mesalibrary.org/find/stuffbrary>

Moskovitz, D. (2020). *The Social Lean Canvas*. <https://dave.moskovitz.co.nz/2020/05/29/the-social-lean-canvas/>

Naturvation. (n.d.). *Taking Action for Urban Nature—Business Models*. NATURVATION. Retrieved May 14, 2022, from <https://naturvation.eu/businessmodels>

Osterwalder, A., & Pigneur, Y. (2010). *Business model generation: A handbook for visionaries, game changers, and challengers* (Vol. 1). John Wiley & Sons.

Otola, I., Grabowska, M., & Kozak, M. (2021). What Constitutes the Value in Business Model for Social Enterprises. *Polish Journal of Management Studies*, 24(2), 336–353. <https://doi.org/10.17512/pjms.2021.24.2.21>

Ozanne, L. K., Ozanne, J. L., & Martin-Neuninger, R. (2019). *The Social Benefits of Toy Libraries in Australia*.

Petrescu, D., Petcou, C., Safri, M., & Gibson, K. (2021). Calculating the value of the commons: Generating resilient urban futures. *Environmental Policy and Governance*, 31(3), 159–174. <https://doi.org/10.1002/eet.1890>

Raggers, S., & Schickner, A. (2017). *No Shared Vision for the Sharing Economy? Exploring the Transformative Potential of the non-profit Sharing Economy in Southern Sweden*. Lund University.

Samuel, A. (2018). *Towards a Grounded Theory of Social Enterprise Places: Building Legitimacy and Markets for Social Enterprises*. <http://orca.cf.ac.uk/115149/2/SEUK%20MACRO%20presentation%20.pdf>

Setting up a social enterprise. (n.d.). GOV.UK. Retrieved April 20, 2022, from <https://www.gov.uk/set-up-a-social-enterprise>

Share and Repair Bath. (n.d.-a). *Share and Repair Bath*. Retrieved February 27, 2022, from <https://shareandrepair.org.uk/library-of-things/>

Share and Repair Bath. (n.d.-b). *Share and Repair Gift Card*. Retrieved April 22, 2022, from <https://giftup.app/place-order/fa788c59-baa9-4b38-805c-9e9ff0f9bc0f?platform=Hosted>

Share and Repair Bath. (2021, August 25). *Meet the team: Ellen, our General Manager*. https://www.youtube.com/watch?v=Vme55oh_QMA

Share Bristol. (2021, October 25). *Room hire*. <https://www.sharebristol.org.uk/kingswood/room-hire/>

SHARE Oxford. (2019, August 9). *Library of Things FAQ*. SHARE Oxford - A Library of Things. <https://shareoxford.org/library-of-things-faq/>

SHARE Oxford. (2020, May 28). *Impact Reports*. SHARE Oxford - A Library of Things. <https://shareoxford.org/about-us/impact-report/>

SHARE Oxford. (2021). *SHARE Oxford Impact Report 2021*. <https://shareoxford.files.wordpress.com/2021/05/share-oxford-impact-report-2021.pdf>

SHARE:Frome. (n.d.). *FAQs*. SHARE: Frome, A Library of Things. Retrieved February 28, 2022, from https://sharefrome.org/faqs/?Display_FAQ=5260

SHARE:Frome. (2020). *Borrower's Agreement & Equipment Use Policy*. <https://ln2.sync.com/dl/7d7ccd390/zq7hbv9v-u92xzbp3-7yhapt5j-v9niqiry/view/doc/1432176051>

Social Business Design. (2020, May 19). *Charity and Social Enterprise: Differences and Similarities*. Social Business Design. <https://socialbusinessdesign.org/charity-vs-social-enterprise-what-is-the-difference/>

Täuscher, K., & Laudien, S. M. (2018). Understanding platform business models: A mixed methods study of marketplaces. *European Management Journal*, 36(3), 319–329. <https://doi.org/10.1016/j.emj.2017.06.005>

Tavory, I., & Timmermans, S. (2014). *Abductive Analysis: Theorizing Qualitative Research*. University of Chicago Press.

Taylor, A. (2018, March 22). *Bike Share Oversupply in China: Huge Piles of Abandoned and Broken Bicycles* - *The Atlantic*. <https://www.theatlantic.com/photo/2018/03/bike-share-oversupply-in-china-huge-piles-of-abandoned-and-broken-bicycles/556268/>

The Better Good. (n.d.-a). *Contact*. The Better Good Store. Retrieved April 24, 2022, from <https://the-better-good-store.myshopify.com/pages/contact>

The Better Good. (n.d.-b). *What We Do*. The Better Good Store. Retrieved April 24, 2022, from <https://the-better-good-store.myshopify.com/pages/what-we-do>

United Nations. (n.d.). *SDG 12*. Retrieved December 10, 2021, from <https://unstats.un.org/sdgs/report/2021/goal-12/>

Voytenko Palgan, Y., Mont, O., & Sulkakoski, S. (2021). Governing the sharing economy: Towards a comprehensive analytical framework of municipal governance. *Cities*, *108*, 102994. <https://doi.org/10.1016/j.cities.2020.102994>

Wang, J. (2018). Identify Social Enterprises. *American Journal of Industrial and Business Management*, *8*(7), 1700–1715. <https://doi.org/10.4236/ajibm.2018.87114>

Wasserbaur, R., Sakao, T., & Milios, L. (2022). Interactions of governmental policies and business models for a circular economy: A systematic literature review. *Journal of Cleaner Production*, *337*, 130329. <https://doi.org/10.1016/j.jclepro.2021.130329>

Appendix A: Population of LoTs Studied

The table below lists the 90 LoTs studied:

Library of Things	City	State or Province	Country
Allen County Public Library	Fort Wayne	Indiana	United States
Allerleih	Kassel	Hesse	Germany
AusleihBar	Marburg	Hesse	Germany
Banff Public Library	Banff	Alberta	Canada
Beaverton Library	Beaverton	Oregon	United States
Benthyg	Rumney	Wales	United Kingdom
Beverly Public Library	Beverly	Massachusetts	United States
Bib-der-dinge-bochum	Bochum	North Rhine-Westphalia	Germany
Biblioteca de les Coses	Barcelona	Catalonia	Spain
Bibliothèque de Bagnes	Le Châble	Valais	Switzerland
Borrow Don't Buy	Plymouth	England	United Kingdom
Bridges Library System	Waukesha	Wisconsin	United States
Brookline Library	Brookline	Massachusetts	United States
Bürgerhilfe Maintal e.V.	Maintal	Hesse	Germany
Caixa d'Eines I Feines	Barcelona	Catalonia	Spain
Capital Area District Libraries	Mason	Michigan	United States
Cary Library	Lexington	Massachusetts	United States
Case a Stock	Fribourg	Canton of Fribourg	Switzerland
Circle Centre	Lund	Skåne	Sweden
Curtis Memorial Library	Brunswick	Maine	United States
Denver Public Library	Denver	Colorado	United States
Dover Town Library	Dover	Massachusetts	United States
Elmhurst Public Library	Elmhurst	Illinois	United States
Fiske Public Library	Wrentham	Massachusetts	United States
Fritidsbanken	Multiple Locations	Multiple Locations	Sweden
Hastings Library of Things	Hastings	England	United Kingdom
Heinerleih	Darmstadt	Hesse	Germany
Hillsboro Library	Hillsboro	Oregon	United States
Library of Stuff CIC	Hull	England	United Kingdom
IG-Future	Altdorf	Canton of Uri	Switzerland
KarLeiLa	Chemnitz	Saxony	Germany
Keene Public Library	Keene	New Hampshire	United States
Kernow Library of Things	Penryn	England	United Kingdom
Kitchener-Waterloo Library of Things	Kitchener	Ontario	Canada
Knihovna věci Brno	Brno	South Moravian Region	Czech Republic
Knížnica Vecí	Bratislava	Bratislava Region	Slovakia
Knjižnica REČI	Ljubljana	Ljubljana	Slovenia
Knjižnica REČI	Delémont	Canton of Jura	Switzerland
La Boutique du Partage	Nantes	Pays de la Loire	France

Library of Things	City	State or Province	Country
La Bricothèque	Martigny	Valais	Switzerland
La Manivelle - Geneva	Geneva	Canton of Geneva	Switzerland
La Manivelle Lausanne	Lausanne	Vaud	Switzerland
La Manivelle Nyon	Nyon	Vaud	Switzerland
La Tatouthèque	Yverdon-les-Bains	Vaud	Switzerland
La Trucothèque	Neuchâtel	Neuchâtel	Switzerland
leih.lokal	Karlsruhe	Baden-Württemberg	Germany
Leihbar Bern	Bern	Canton of Bern	Switzerland
Leihbar Bonn	Bonn	North Rhine-Westphalia	Germany
Leihbar Luzern	Lucerne	Canton of Lucerne	Switzerland
Leihbar Thun	Thun	Canton of Bern	Switzerland
LeihBARaque	Murten	Canton of Fribourg	Switzerland
Leihladen Bochum	Bochum	North Rhine-Westphalia	Germany
Leihlager	Basel	Basel-Stadt	Switzerland
Leihothek	Münster	North Rhine-Westphalia	Germany
Leila Berlin	Berlin	Berlin	Germany
Leila Wien	Vienna	Vienna	Austria
Leila: La Biblioteca degli Oggetti	Bologna	Emilia-Romagna	Italy
Lewes Library of Things	Lewes	England	United Kingdom
Library of Stuff Mullumbimby	Mullumbimby	New South Wales	Australia
Library of Things Ltd.	London	England	United Kingdom
Library of Things YXE	Saskatoon	Saskatchewan	Canada
Lincolnwood Library	Lincolnwood	Illinois	United States
Luula	Heidelberg	Baden-Württemberg	Germany
Make-Do Library of Things	Bulli	New South Wales	Australia
Mesa Public Library	Mesa	Arizona	United States
Norfolk Public Library	Norfolk	Massachusetts	United States
Oggettoteca Locarno	Locarno	Ticino	Switzerland
Prague Library of Things	Prague	Prague	Czech Republic
Reading Public Library	Reading	Massachusetts	United States
Richland Library	Richland	South Carolina	United States
Sacramento Public Library	Sacramento	California	United States
Share and Repair Bath	Bath	England	United Kingdom
Share Bristol	Bristol	England	United Kingdom
Share Oxford	Oxford	England	United Kingdom
Share Shed	Devon	England	United Kingdom
SHARE:Frome	Frome	England	United Kingdom
Somerset Public Library	Somerset	Massachusetts	United States
Somerville Public Library	Somerville	Massachusetts	United States
Spullenier	Utrecht	Utrecht	Netherlands
Teilbar	Stuttgart	Baden-Württemberg	Germany
Temple Terrace Public Library	Temple Terrace	Florida	United States

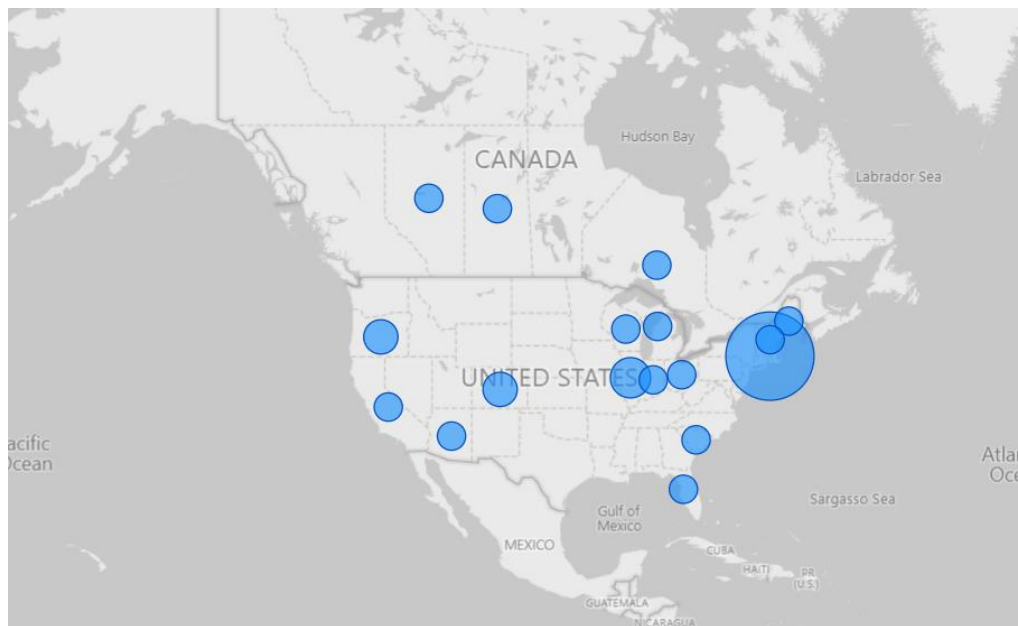
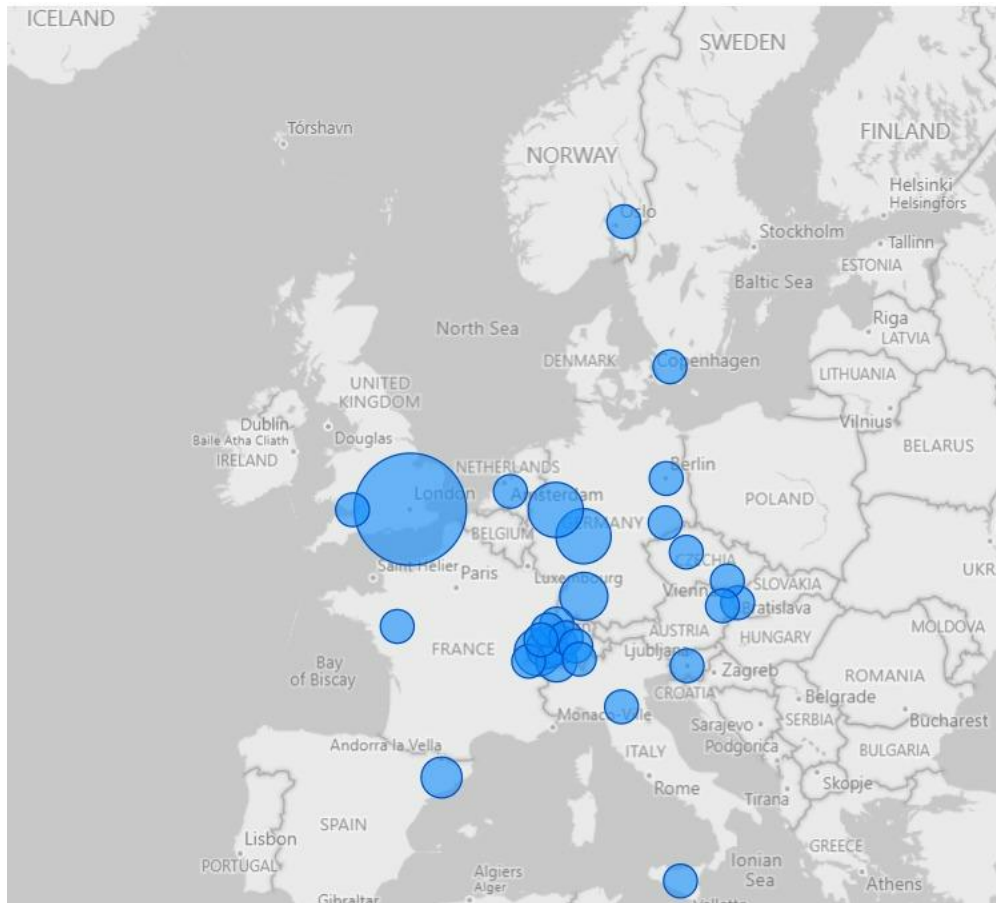
Library of Things	City	State or Province	Country
The Sydney Library of Things	Sydney	New South Wales	Australia
Tingenes Bibliotek	Nesoddtangen	Akershus	Norway
Topsfield Town Library	Topsfield	Massachusetts	United States
Washington Centerville Public Library	Centerville	Ohio	United States
Wayland Free Public Library	Wayland	Massachusetts	United States
West Chicago Public Library	Chicago	Illinois	United States
Weyshare	Weymouth	England	United Kingdom
Wilkinson Public Library	Telluride	Colorado	United States
Zero	Palermo	Sicily	Italy

The bubble map below shows the distribution of the LoTs studied by country:



The bubble maps below show the distribution of LoTs by state or province for Australia, Europe, and North America:





Appendix B: List of Personal Communication

Reference	Position & Organization	Format	Purpose	Dates
R1	Founder, Library of Stuff CIC (Hull, UK) Customer Support, Lend Engine (LoT Software Provider)	Video Conference	Background Interview	January 4, 2022
			Impact reporting & membership model	April 5, 2022
R2	Board President, Circle Centre (Lund, Sweden)	Video Conference	Background Interview	January 25, 2022
R3	LoT Practitioner, Leila-Bologna (Italy)	Video Conference	Temporary inventory donations	March 24, 2022
R4	LoT Practitioner, Heinerleih (Germany)	Email	Temporary inventory donations	March 25, 2022
R5	LoT Practitioner, Leihbar Bonn (Germany)	Email	Temporary inventory donations	April 8, 2022
R6	Adult Services Librarian, Curtis Memorial Library (Maine, US)	Video conference	B2C vs. public-to-citizen	April 11, 2022

Appendix C: Interview Consent Form

CONSENT FORM

This form is to ensure that you have been given information about the research project and to give you opportunity to confirm that you are willing to take part in this research. For all activities below, please indicate (with X) which applies to you:

	I have been familiarized with the thesis project, I have had the possibility to ask questions and I have received satisfactory answers to my questions.
	As a research participant, I am aware of my right to withdraw participation at any time.
	I give my consent that the content of my interview can be transcribed, analyzed and published in research outputs for the project.
	I give my consent to be identified by name
	I give my consent to be identified only by my position in the organization
	I give my consent to be identified only by my organization

Note: Your participation is voluntary. As an interviewee, you do not have to answer all the questions that are asked; you reserve the right to refuse or cease participation in the interview process without stating your reason and may request to keep certain materials confidential. At any stage of the research (until May 20, 2022), you have a right as a research participant to gain access to your own personal data, request its correction or deletion or limitation to processing of data as well as file a complaint about how your personal data is used.

Please, sign below to confirm your consent:

	Participant(s)	Researcher(s)
Name(s)		
Signature(s)		
Date(s)		

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