

Scaling Up Upcycling: A Comparative Analysis of Furniture, Lighting and Bags Made Through Repurposing

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Abstract

Upcycling offers a transitional approach to the circular economy, using current material recovery systems in ways which increase the value of waste materials, namely through reuse, repair, refurbishment, remanufacturing, and repurposing. Research tackling the challenges of scaling up upcycling has largely focused on meso and macro level factors and lacks details in terms of the day-to-day practices of upcycling designers. This chapter offers a comparative analysis of 20 upcycled products to contribute to an understanding of scaling up upcycling through the lenses of operational scalability and business viability. Cross-disciplinary literature review identifies the craft nature of production in the repurposing approach of many upcycling enterprises as the key challenge for scaling-up. Comparative analysis of the cases confirms this challenge and identify material sourcing, design, production, marketing and distribution practices as helpful factors. The findings contribute to supporting designer-makers and other practitioners in creating and scaling up upcycling enterprises.

Introduction

The upbeat feel of the word “upcycling” makes it a handy catchphrase in academic research, the business world and DIY culture alike for embracing repair, refurbishing, remanufacturing, reuse and repurposing, as well as certain forms of recycling. This chapter focuses on upcycling through repurposing, also known as creative reuse, in the sectors of furniture, lighting and bag design, and how this practice can be scaled up.

The furniture sector has been identified as a critical sector for circular economy initiatives, as it generates large amounts of waste yet typically operates with small-scale, flexible production systems (European Commission, 2020; Oakdene Hollins and Dillon, 2021). Thus far, the sector’s upcycling-related activities have been predominantly carried out by individual artisans or micro-scale enterprises focusing on resale, repair and refurbishment. A handful of more organised small, medium and large enterprises underscore the sector’s circularity potential, notably through the remanufacturing of office furniture. However, upcycling research in furniture remains scant.

Despite its advantages, upcycling remains a niche, small-scale practice in developed countries (Singh et al., 2019). Scaling up upcycling offers designers the possibility of working sustainably, meaningfully and viably while increasing material circularity. The problem of scaling up upcycling is vast, and research in recent years has examined a wide range of interconnected challenges and enablers, from macro and meso-level government and systemic perspectives to micro-level, designer and individual enterprise aspects. A few case studies on upcycling enterprises have shed light on specific business and operational aspects relating to scaling up. This research project offers a comparative analysis to expand on these cases and draw broader conclusions to help improve the possibility of scaling up among designers practising upcycling through repurposing. Repurposing has been defined as a form of reuse of discarded material for a new purpose, which brings about “new value creation with a minimum loss of material integrity” (Van Hees & Oskam, 2021, p.2). This project further clarifies repurposing as the use of waste objects or material, whose original form and structure are still recognisable, for a different function than what they were initially produced for while maintaining this recognisability and increasing value in the resulting new object or material.

In terms of an enterprise’s day-to-day practices, scaling up involves two key dimensions: first, the scalability of the organisation and its operations – an organisation’s ability to grow with increased production without being constrained by its structure or available resources, and second, the viability of the business or a project – its ability to carry on and sustain profits over the long term. To understand scalability and viability as they apply to upcycling enterprises, a cross-disciplinary analysis allows us to dimensionalise the connection between upcycling and craft, and to examine the ways in which upcycling creates value and how consumers perceive this value.

Upcycling, Craft and Scalability

The scalability of upcycling is constrained by its craft nature, a characteristic identified in previous research on upcycling (Singh et al., 2019; Sung et al., 2021; Sung & Cooper, 2015; as cited in Sung et al., 2022). While upcycling has resulted in successful small and medium-sized enterprises, the majority of professional upcyclers can be described as designer-makers, a term increasingly used to refer to craftspeople (Luckman & Andrew, 2020). Upcycling and craft share positive ethical qualities (Archer & Björkvall, 2021; Zhan & Walker, 2019); given its environmental and social benefits, upcycling can be seen as a form of sustainable craft. In terms of production benefits, craft has been found to offer the flexibility to scale up or down according to project needs. Craft's interdisciplinary nature also helps to solve design and production problems, and craftsmanship adds value to design and its communications (Woolley, 2011).

While craft's advantages have the potential to help benefit repurposing projects, upcycling and craft also share issues of production efficiency and viability (Caldera et al., 2022; Zhan & Walker, 2019), which, along with the complexity of working with waste objects and materials, may well explain the time-consuming and labour-intensive processes of upcycling (Singh et al., 2019; Sung & Abuzeinab, 2022). Other key scalability challenges facing upcyclers on a day-to-day operational level include access to materials, affordable space, equipment and expertise (Singh et al., 2019). Furthermore, each industry has particular technical and organisational challenges and a need for tailored solutions (Caldera et al., 2022). Furniture production materials and finished products can require significant storage space, and certain materials require specialized expertise to work with. In a nutshell, the craft nature of upcycling through repurposing is a major stumbling block to production scalability. While not all designer-makers or upcyclers desire growth (Luckman, 2018; Sung et al., 2022), upcycling requires some level of scale to help its practitioners earn a viable living. It is striking to note that during the search for upcycled products to be included in this analysis, a significant number of promising examples were found to be no longer available.

Upcycling Value Creation, Purchase Drivers and Viability

The viability of a business or project is related to multiple factors, including the managerial abilities of the individuals involved, access to capital and other resources, strategic partners, and cost structure. In light of research findings and resources in the field of circular business model canvases, this research focuses on elements of viability that can be evaluated with relative ease based on secondary source information, namely product value proposition, distribution channels, communications and community building, and environmental and social sustainability factors (Lewandowski, 2016; Live Circular Canvas Consortium, 2020).

The value created by upcycling significantly influences the perceptions and desirability of upcycled products. Upcycling enhances value through design, creativity, and

storytelling, transforming discarded items into objects with new functional or aesthetic appeal. This process generates four key forms of value:

1. **Design/Creativity Value:** through the creative idea of its new purpose or context, through unique aesthetics, and or through enhanced functionality or innovative features making them attractive to consumers (Baik & Kim, 2014; Buck & Lee, 2020; Yu & Lee, 2019).
2. **Environmental Sustainability Value:** through the diversion of waste from landfills and offering an alternative to products made from virgin materials (Archer & Björkvall, 2017).
3. **Ethical Value:** through messages of sustainability and anti-consumerism, reflecting ethical consumption practices and promoting social responsibility (Adıgüzel & Donato, 2021; Archer & Björkvall, 2017).
4. **Storytelling Value:** through the story of the object's transformation, which enhances the consumer's connection and engagement with the object. This occurs inherently when the object's original identity is recognisable, a concept known as "past identity salience" (Kamleitner et al., 2019), which can also be conveyed through mediums such as websites, packaging or other forms of communication to increase audience engagement and sales (Kamleitner et al., 2019).

These forms of value feed into the value proposition of the upcycled object in various proportions, affecting its perceived ability to meet people's needs and thus influencing its sales potential and viability. With repurposing, the transformation story is inherently greater than with repair, refurbishing or remanufacturing, so we tend to see repurposed objects as more creative or unique, and their story is more compelling. On the other hand, upcycled products can also be perceived by consumers as risky, with functional, social and financial risks identified as critical barriers to purchase (Park & Lin, 2020; Yoo et al., 2021; Yu & Lee, 2019). Being upcycled is no guarantee of desirability, and some upcyclers prefer to focus on aspects other than the upcycled nature of their designs (Singh & Ordoñez, 2016). In a broader market perspective, the ability to compete with non-upcycled products has been identified as a critical success factor in upcycling enterprise case studies (Sung et al., 2022).

As part of a broader research project on improving scalability and viability in upcycling design, this research aimed to expand on previous case studies and help fill the knowledge gaps in scaling up upcycling enterprises (creating furniture, lighting and bags) from an operational scalability and business viability perspective. While the focus was on designer-driven micro and small enterprises, one medium-sized and two large enterprises were included in the analysis. The results, therefore, may be of interest to larger design studios or established manufacturers considering upcycling projects.

Methods

To investigate the issue of scaling up upcycling beyond individual case studies, this research employed comparative analysis. Commonly employed methodology in the social sciences when data is insufficient to enable statistical analysis, comparative analysis seeks causal relationships across two or more cases, with some level of explanation beyond simple description (Pickvance, 2001).

Comparative Analysis Design

The cases of upcycling through repurposing waste materials to create new furniture and bags (n=20) were discovered through Internet research. To ensure a variety among the 20 cases included in the study, four sub-categories were selected: seating, small tables, lighting, and bags. Although not related to furniture or interior design, bags were included to open perspectives on scaling up. From the initial search results, projects were selected based on their apparent product quality and craftsmanship, and a minimum of five years of business operation as an indication of the relative viability of the enterprises behind them. Additionally, the selection aimed for a variety of waste materials, price points, and production strategies. The following tables (Tables 11.1-11.3) present material scalability factors, production scalability factors, and product and business viability factors considered in the comparative analysis, developed on the basis of literature review findings and insights..

Table 11.1: *Material Scalability Factors*

Scalability Factors	Analysis Criteria	Categorical Values
Waste material	Description of waste material used in the object	–
Waste material uniformity	Degree of uniformity in waste material form	<i>high, medium, low</i>
Waste source(s)	Description of material source(s)	–
Waste incidence	Qualification of the rate of occurrence of the waste material across its various sources	<i>sporadic, periodic, regular, continuous</i>

Table 11.2: *Production Scalability Factors*

Scalability Factors	Analysis Criteria	Categorical Values
Production strategy	General strategy used in the production system	<i>Periodic batches, batch-to-order, made-to-order</i>
Design and production approach	Design and production characteristics, and key steps in material preparation and production.	–
Product variations	Size, colour or other customization options	–
Production complexity	Steps involved, labour intensity, level and prevalence of required skills	<i>high, medium, low</i>

Table 11.3: *Product and Business Viability Factors*

Viability Factors	Analysis Criteria
Design/creativity value	Uniqueness, innovation, functionality, quality, features, aesthetics, product options
Storytelling value	Past identity salience of the object, or design/communication initiatives to convey the story
Environmental sustainability value	Material that is difficult to recycle, proportion of upcycled vs. new material content of the object, other sustainability practices of the enterprise
Social sustainability value	Socially responsible production, profit sharing
Price competitiveness	As compared to products of comparable functionality, quality and design/creativity value on the market (upcycled or not)
Distribution channels	Self-distribution, number and complementary nature of other distribution channels, shipping factors
Communications and community building	Community of interest related to the material, social media usage and followers
Number of followers	Number of followers on Instagram
Staff size	Number of full-time employees including the owner on average
Business started	Year the company or individual started doing their business

Data Collection

Internet research was carried out using Google as well as Pinterest, Instagram and Facebook and key words “upcycled,” “upcycling,” “repurposing,” “reuse” and “waste” in combination with “design” and key words related to the furniture, lighting and bag categories. Case data gathered was predominantly secondary source, with information gathered on websites and social media channels associated with the enterprises supplemented at times with existing articles and case studies. Emails were also

exchanged with designer-makers or other staff in the enterprises to validate the information gathered, particularly regarding material sourcing and production steps.

Data Analysis

Based on the production approach, labour intensity, and the skill level required, an assessment of production complexity was evaluated for each case, with three possible values of *high*, *medium* or *low*. This categorical assessment was qualitative and was not validated by the enterprises. For instance, when the process required relatively rare skills related to the designer's tacit knowledge, (such as metal forming techniques using bicycle rims), and/or high labour intensity and multiple handmade processes, complexity was rated *medium* or *high*. Other qualitative factors have been synthesised as:

- *Scalability enablers and scalability challenges*, relating to both material and production aspects of scaling up from an operational standpoint; and
- *Viability enablers and viability challenges* relating to the project and the business, such as its distribution network, brand reputation, and so on.

The secondary data gathered and subsequent validations with the upcycling designers or companies were summarised for seating, tables, lighting and bags in the comparative analysis tables, which can be accessed through the online appendix:

https://spectrum.library.concordia.ca/993978/1/Upcycling%20comparative%20analysis_dataset.pdf

Results

Furniture and Object Case Characteristics

The cases selected resulted in a wide variety of products within each of the four categories and particularly across the 20 projects, ranging from pendant lamps serially produced from wine bottles, priced at €49, to a complex coffee table hand-crafted to order from scrap wood and designed by upcycling design pioneer by Piet Ein Eek, with a price tag of €3,014. Thirteen cases were micro-enterprises of one to nine employees, including five solo entrepreneur ventures (who, in some cases, outsourced to production partners). Five other cases were well-established small enterprises of 10 to 49 employees. Freitag, with 250 employees, is the largest upcycling-driven manufacturer. In the large enterprises cases of Delta Light and Lufthansa subsidiary Miles & More, the upcycled product was part of a special project within the companies' typical product lines. The data for the 20 projects covered 21 enterprises, as Miles & More, the producer, outsourced manufacturing to upcycling studio B2L Group, so information from both companies was included. Table 11.4 provides a summary of categorical data aggregated from the projects/cases detailed in the aforementioned online appendix. In half of the cases, the waste material was from commercial or institutional (public service-related) sources. Four cases used industrial (manufacturing) waste, while the

remaining seven cases used post-consumer waste. Waste material uniformity was assessed as either medium or high, with waste incidence rates that were regular or constant for 16 of the 20 cases.

Table 11.4: *Upcycling Projects Categorical Data Summary*

Factors	Categorical values	Seating	Small Tables	Lighting	Bags	Total cases
Waste Source Type	Post-consumer	4	–	1	2	7
	Industrial	–	1	2	1	4
	Commercial/Institutional	1	4	2	3	10
Uniformity	High	2	3	2	3	10
	Medium	3	2	3	2	10
	Low	–	–	–	–	–
Incidence	Sporadic	–	1	–	1	2
	Periodic	1	1	–	–	2
	Regular	4	3	3	4	14
	Constant	–	–	2	–	2
Production strategy ¹	Periodic batches	1	3	5	5	14
	Batch to order only	1	–	–	–	1
	Batch + made to order components	2	–	–	–	2
	Made-to-order only	1	2	–	–	3
	Custom batch to order option	1	–	–	3	4
	Custom made-to-order option	2	1	1	–	4
Production complexity	High	2	3	1	2	7
	Medium	3	2	1	1	8
	Low	–	–	3	2	5
Number of followers	< 1,000	1	3	1	–	5
	1,000 to 3,000	3	1	–	–	4
	3,000 to 10,000	1	–	2	3	6
	10,000 +	–	2	1	2	5
Staff size ¹	1	2	1	2	–	5
	2 to 9	2	2	2	2	8
	10-49	1	2	–	2	5
	50+	–	1	1	1	3
Years in business ¹	< 5	–	–	–	–	–
	5 to 10	3	3	4	–	10
	10 +	2	3	1	5	11

¹ One of the projects involved two companies, so company-related data sample totals 21 rather 20

Periodic batch production was predominant, accounting for two-thirds of the cases. Danish enterprise Traels, which only sells to institutions or businesses, uses a “batch-to-order” strategy, requiring a minimum order of ten units of its Airbag puff cushion. Two seating projects adopted a mixed approach, with the structure of the stool or chair produced in batches and their seats (and backrest in one case) made to order, allowing for custom colour or artwork options. Eight of the 20 cases also offered custom order options for individuals or multi-unit corporate orders.

As a critical scalability factor, the results of the production complexity assessment underscore the craft production nature of repurposing, with only five of the 20 projects evaluated as low complexity and the rest evenly divided between medium and high complexity. As a potential indicator of viability, a bit less than half the enterprises had less than 3,000 Instagram followers at the time of writing, and five had less than 1,000, which may also suggest that these enterprises may be connecting with their audiences in ways other than Instagram. Six cases had between 3,000 and 10,000 followers, while the five remaining were over 10,000, with bag-makers Elvis & Kresse at over 35,000 and Freitag at over 192,000, numbers which also reflect the longevity of these companies.

Material Selection and Sourcing Scalability Factors

Decisions related to waste material and its sources are key to both scalability as well as viability, as they have a direct impact on costs. Table 11.5 summarises enablers and challenges in this regard. Material prevalence is an obvious factor. Abundant materials such as wine bottles and scrap wood are commonly seen in upcycled products, however, this can result in increased competition and less product differentiation, thus affecting viability. Cardboard pendant lamps are a good example of this issue. The relative difficulty of sourcing less common materials such as skateboards or used sails serves to illustrate the advantages of establishing sourcing networks. For example, Alchemy Goods installs branded bins in a network of bike shops to collect inner tubes, as Mister Wilson's does with skate shops to collect used and broken skateboards.

Table 11.5: *Material Selection and Sourcing Scalability Enablers and Challenges*

Material Scalability Factors	Enablers	Challenges
Waste material selection	Prevalent or abundant material Foreseeable prevalence in the future Material with limited lifespans Difficult to recycle material	Limited, uncommon or rare material Uncertain availability in the future Material that is becoming outdated Material with a high value for recyclers
Uniformity	High uniformity	Low or medium uniformity
Source(s)	Multiple sources Close/easy to access sources Reliable source Establish one's own sourcing network	Single source or only few sources Far/difficult to access sources Unreliable or difficult to plan around sources
Incidence	Occurs regularly or constantly	Single opportunity Occurs sporadically or periodically
Transportation	Low transportation costs	Significant or high transportation costs

The cases here show that commercial sources can work as regular sources for materials such as discarded office chairs, truck tarpaulins, and wood offcuts. Institutional sources such as fire brigades (fire hoses) and national aviation or train companies (multiple components) are also reliable, with decommissioned materials to offer on a periodic

basis. In contrast, manufacturers can offer a range of materials, from offcuts to non-compliant products. Material with inherently limited lifespans can offer good opportunities, too. Lifespan can be limited by periodicity, such as auction banners, by decreasing performance over time, such as sails or truck tarpaulins, and by safety standards, such as fire hoses.

However, material transportation and storage costs and environmental impact should also be considered. For example, large sails weighing 400 to 600 kg require a platform truck to move, and sources may be located far from the production location. Material selection also impacts production: time and costs required to prepare particular materials for reuse, such as cleaning, repair, disassembly, and cutting to sizes manageable for production. For example, in order to extract specific components during the dismantling of Lufthansa aircraft, Miles & More collaborates with a partner company that possesses the requisite machinery and technical expertise.

Material Transformation, Design and Production Scalability Factors

The processes, resources, partners and strategies involved in transforming waste material into furniture and object designs all influence production scalability, which in turn affects business viability. Table 11.6 offers an overview of how these factors work. The material form can become a production scalability opportunity: if the form is already engaging and functional for the new purpose, it may only require minimal transformation. Delta Light's aluminium profile offcuts are a good example, with their sophisticated extruded form requiring only simple cutting, grinding, powder coating and assembly to work as a very contemporary-looking wall scone. Commonly available tools, facilities and processes requiring common skills, such as sewing and standard metalwork, help keep costs in line. For Rebottled's lamps made from wine bottles, the relative simplicity of the production approach also enables the enterprises to outsource their production to bring down their costs and adapt to demand fluctuations.

Table 11.6: *Material Transformation, Design and Production Scalability Enablers and Challenges*

Production Scalability Factors	Enablers	Challenges
Preparation for reuse	Material requiring little preparation for reuse	Material requiring significant preparation for reuse
Transformation	Material and design requiring minimal transformation	Material and design requiring significant transformation
Tools & facilities	Material and design requiring commonly available tools and facilities	Material and design requiring specialized tools and facilities
Processes and skills	Material and design that reduces production steps and time Material and design requiring simple processes and/or common skills	Material and design that increases production steps and time Material and design requiring complex processes and/or high level or specialized skills
Automation	Material and design that allows automation	Material and design that requires handmade processes
Material variations	Design that adapts easily to material variations	Design requiring significant changes for each variation
Manufacturing partners	Local, cost-effective manufacturing partners for major manufacturing steps or specialized processes	Long distances from manufacturing partners, or high local costs
Outsourcing	Material and design that allows cost-effective national or international outsourcing of production steps to manufacturing partners with equitable labour practices	Large, heavy material or resulting products
Product options	No options or few options	Multiple options
Production strategy	Flexible batch production Limited series of significant size	One-offs, made to order, small limited series

Material form can become a production scalability opportunity, i.e.: if the form is already interesting and functional for the new purpose, it may only require minimal transformation. Delta Light's aluminum profile offcuts are a good example, with their sophisticated extruded form requiring only simple cutting, grinding, powder coating and assembly to work as a very contemporary looking wall sconce.

Commonly available tools, facilities and processes requiring common skills, such as sewing and common metalwork, help keep costs in line. For Rebottled's lamps made from wine bottles, the relative simplicity of the production approach also enables the enterprises to outsource their production to bring down their costs and adapt to demand fluctuations.

Automation is a significant enabler of production efficiency, although it typically requires the use of uniform materials. The flooring and ceiling panels from Dutch Railways decommissioned regional trains are uniform enough to use CNC routers to cut forms for Veldtwerk's chair and OpNieuw!'s office side table. However, some upcycled products also incorporate a proportion of virgin materials to enable automation. Mister Wilson's

stools are a good example, whereby the seat is made from used or broken skateboards, and the legs are made from birch plywood, enabling them to be cut using a CNC router. Manufacturing templates such as cutting templates and sewing patterns used by bag makers or jigs used to hold steel parts together for welding help increase production efficiency and precision. Custom-made parts can be another enabler. Anti has 3D parts printed from recycled plastic, which, though relatively costly to produce, include brackets designed to work with all kinds of umbrellas and help keep overall production time to two to three hours per lamp.

Viability Factors

While scalability factors often impact viability as well, viability factors per se focus on the four types of upcycling value creation identified in the introduction, as well as price competitiveness, distribution, communications and community building. Table 11.7 aggregates viability findings from the cases. As with production scalability, material factors play an essential role in a product's viability. Some materials come with an inherent community of interest, such as cyclists (Bike Furniture Design), sailors and sea-lovers (Salty Bag, and Dvelas' chair) or aviation enthusiasts (Lufthansa table). Material variations can be leveraged to help reinforce the uniqueness of a product: Freitag, for example, uses different colours and graphics of truck tarps to create unique designs (Fig.11.1). Materials from rare sources can create a sense of exclusiveness with a limited series, as does Mariclaro with leather from cult brands of vintage cars.

Table 11.7: *Viability Enablers and Challenges*

Viability Factors	Enablers	Challenges
Design/creativity value	- Designs with unique, creative, innovative and/or aesthetics qualities - Material variations leveraged to enable unique designs using existing templates - Material from rare sources or rare versions of materials to create limited editions	- Many products using same waste material - Unoriginal or outdated design/aesthetics - Overly niche design or aesthetics - Trendy design that may become quickly outdated - No colour options
Functional value	- Material and design suitable for a variety of applications or environments - Product that can be used for more than one purpose or in different configurations - Features that increase functionality - A choice of colours, size or other options	
Storytelling value	- Product design makes past identity easy to discern - Product design includes text about past identity - Packaging or merchandising mentions past identity - Website or social media refers to past identity - Connections to material's past life through details about its existence	- Past identity is difficult to discern - Past identity is not communicated
Environmental sustainability value	- Material that is difficult to recycle - High proportion of material content is upcycled - Non upcycled materials are recycled - Designed for long life - Repair service to extend product life - Platform for exchange or resale - End-of-life take-back possibility	- Significant proportion of new (virgin) material content - Lack of information on product quality or longevity - No repair option
Social sustainability value	- Produced using equitable labour practices - Produced through a social enterprise - A proportion of profits donated to a social cause	Produced in a country known for unfair labour practices with no mention as to these concerns
Price competitiveness	Competitively priced vs. comparable value products (upcycled or not)	High prices vs. comparable value products (upcycled or not)
Distribution	- Distributed through different channels - Many distributors complementary to one another - Only one unit of a product with a given material colour/pattern made available at a time - Low shipping costs	- Self-distribution only - High shipping costs
Community building and communications	- Material or products with a community of interest - Consistent social media posting to increase reach - Engaging sourcing and production process images - Celebrating the past lives of material - Celebrating the craftsmanship of people involved - High quality photos of products in use contexts - Participation in design and sustainability exhibitions - Media coverage	- Inconsistent use of social media - Low number of followers

Figure 11.1: *Capitalizing on Material Variations at Freitag to Create Uniqueness*



Tettamanti, J., [nd]. Photograph. Freitag 2023. <https://www.freitag.ch/en/production>

While uniqueness is often a strong driver of upcycled products, functionality and the ability to fit into a variety of applications can enable a broader market for a product. Simple white Dacron sail material makes Dvelas' outdoor chairs suitable for a wide range of environments, thus facilitating commercial sales. The stool that can work as a mini table, the laptop sleeve in a backpack, and the choice of sizes, colours, patterns, and finishes — all features which enhance the functionality, suitability and perceived value of an upcycled product. There are also different ways to leverage past identity in the storytelling of upcycled products. Markings occurring on the original material can be leveraged in the design, such as markings on a firehose that we see on the bag or typography on an aircraft fuselage that forms a pattern on a tabletop. Text relating to origins can be incorporated into the design of the product or its merchandising, as Mariclaro and Salty Bag do in different ways (Figure 11.2). Each Salty Bag product includes numbers on its hang tags, which allow customers to find information on its website about the particular sail used in that bag: the type of sail, its geographic origins, and where it was sailed. Reinforcing uniqueness in their online store product selection, bag makers Mariclaro and Freitag websites appear to offer only one unit at a time of each bag model made with a given material source (colour and/or graphics). By adding a sales revenue stream, bag makers such as Alchemy Goods can produce multiple units branded with the client's logo (Figure 11.3).

Figure 11.2: *Past Identity Conveyed Through Product Design and Merchandising*



Left: Mariclaro Vie+ Purse Wow Airlines Airbus A321 (<https://www.mariclaro.ca/collections/air-canada/products/mariclaro-vie-purse-wow-airbus-a321>); Middle: Salty Bag Instagram post 1 (<https://www.instagram.com/p/CUhfYu2o30h>); Right: Salty Bag Instagram post 2 (<https://www.instagram.com/p/BcC-XNCFvIM>)

Figure 11.3: *Corporate Orders of Alchemy Goods Products*



Left: Instagram post – Ever Thought About Making Your Promo Products From Old Bike Tubes?! (<https://www.instagram.com/p/CLcQo4oAlj6/>); Right: Shimano Transforms Old Bike Tubes into Zipper Pouches (<https://www.ecologicdesigns.com/shimano-transforms-old-bike-tubes-into-zipper-pouches/>)

In terms of environmental sustainability value, some cases particularly stand out through their use of materials that are difficult to recycle, such as umbrellas or fire hoses. Considering other sustainable practices, micro and small enterprises do not typically have the resources to organise practices such as end-of-life product take-back systems, but some offer extended repair guarantees. Elvis & Kresse and Freitag, two relatively

larger enterprises in the sample, have been awarded accolades for a range of sustainability practices across their operations. Freitag notably offers free spare parts for self-repair and the possibility of swapping one's bag for that of another customer via the company's resale platform on its website. On the social sustainability front, Danish company Traels and Dutch enterprises Tolhuijs Design, OpNieuw! and Rebottled all employ workers from vulnerable sectors of society, either directly or through outsourcing partners. Moogoo's furniture production creates equitable employment in African countries such as Burkina Faso. Elvis & Kresse, a certified B-corporation and accredited Living Wage Employer, donates 50% of their profits to inspiring charity causes.

Pricing is a strategic decision affecting sales and profit margins. In the bag market, products must compete with hundreds of others of similar form and functionality, and the pricing of the cases analysed tends to be competitive with prices of products that are comparable in quality. In the other categories, there were some variations, but the general sense of competitiveness with comparable products remained. Distribution was a weak point for many of the cases in the sample, with self-distribution through their website being the norm, fuelled by word-of-mouth and social media. Instagram can be a significant enabler of brand awareness, but this typically requires a large base of followers as well as a healthy level of follower engagement. A few cases have opted for more diversified distribution strategies, which can be an effective strategy if profit margins and resulting sales volume make it worthwhile. Three of the five bag distributors use third-party distributors, notably Alchemy Goods (165 retailers + several online stores + Amazon) and Freitag (30 company-owned stores + 257 independent retailers). In furniture and lighting, Dvelas and Tolhuijs Design also have networks of outside retailers or online stores. As large enterprises, Delta Light and Miles & More can leverage their international distribution networks to help find customers for their upcycling projects.

To build and nourish their communities of interest, the enterprises analysed employ a few key strategies. The first is to celebrate the past identity of materials with engaging photos that show these past lives in context, as does Bike Furniture Design and Dvelas, which notably uses stock photos and reposts of magnificent sails and sailboats from other accounts (Figure 11.4). Another approach is to engage followers in the material sourcing and product production processes with images that also highlight the labour and craftsmanship involved and help justify the pricing. Freitag details its 15-step process on its website. Detailing the material composition of a product also underscores its sustainability in a transparent, credible way.

Different mediums can serve different purposes. Videos distributed on enterprise websites and social media offer a medium to explain the ethos and or process behind the making of the products. Videos or blog posts can tell the more detailed story of the design, production and features of specific products.

Looking beyond website and organic social media content, Alchemy Goods uses targeted online advertising to follower visitors to its website and increase conversion. Given the competitiveness of the US bag market, this may well be an important tactic for

the company. Several enterprises have taken part in design or sustainability-related exhibitions, and many have benefited from media coverage by publications of various types, potentially helping to reinforce their credibility and prominence in Google search results.

Figure 11.4: *Instagram Posts Celebrating the Past Lives of Material*



Left: Gregg, A. 1986. Photograph. Bike Furniture Instagram post – Campus usually has decent snowbanks. Greg Potvin on his Kos Cruiser at Lee Hall, Spring 1986 (<https://www.instagram.com/p/BNztIQRhWy0>); Right: Photo of a sailing yacht regatta (example of types of photo posted by Dvelas) (<https://pixabay.com/photos/boat-veil-sailboat-sea-ship-5159223>);

Different mediums can serve different purposes. Videos on websites and social media provide an opportunity to present the underlying ethos and reveal the process that goes into making the products. Blog posts can tell a more detailed story of the design, production and features of specific products. In addition to website and social media content, Alchemy Goods employs online advertising to maintain the visibility of its products and to enhance the likelihood of conversion among visitors to its website. Given the competitiveness of the US bag market, this may well be an essential tactic for the company. Several enterprises have taken part in design or sustainability-related exhibitions, and many have benefited from media coverage by publications of various types, potentially helping to reinforce their authority and prominence in Google search results.

Discussion and Conclusions

Material and Production Scalability

In regards to material, the sourcing networks set up by many of the enterprises in this comparative analysis align with the case study findings of Sung et al. in terms of the effective use of material sourcing partnerships, which ensures the reliability and efficiency of waste material to work with (Sung et al., 2022). In terms of production, results from the 20 projects/cases confirm the prevalence of craft production techniques as a defining characteristic of upcycling based on repurposing. The companies Elvis & Kresse, Dvelas and Alchemy Goods have grown into significant small enterprises, while Freitag has become a serious medium enterprise with 250 employees and distribution in 23 countries. Yet, the production of these companies continues to be characterised by craft methods. Two of them have had to resort to international production to meet their needs. Elvis & Kresse set up in Turkey for its second workshop, while Freitag has outsourced sewing to lower-cost European countries. While internationalizing production has an impact on the environmental sustainability of their products, it seems to be a necessary trade-off to ensure a high enough level of scale for these enterprises. For smaller players, keeping production processes simple is an important theme in that it makes it easier to find workers with the skills required and keep costs relatively low.

Anti's use of 3D printed parts to accelerate its umbrella lamp production is a good example of using technology to increase efficiency, dovetailing with previous case study findings of production innovation for competitive advantage (Sung et al., 2022). Automation using technologies such as CNC routing is another example, which works for uniform waste material. Design and creativity are integral to the value proposition of upcycling through repurposing. This leads upcyclers to behave in a manner similar to many other designer-makers of unique craft objects. It has been observed that these creators typically employ low-volume local and artisan production methods to create high-margin products that appeal to niche customer segments. These products are then sold via narrow distribution channels, such as direct online sales, local retailers, or specialised e-commerce platforms (Doussard et al., 2018). The findings confirm the prevalence of design and creativity in the cases and demonstrate how this business model can be implemented effectively. Uniqueness is achieved by leveraging the unique characteristics of the material, while the use of recurring designs, patterns, and jigs ensures efficiency.

Product/Business Viability

Although this research does not provide data on the financial viability of these projects/cases, the relative longevity of the companies suggests that most are at least surviving well enough thus far. Sung et al.'s (2022) paper presented three upcycling case studies that identified the success factors of competitiveness – one of which was competing with non-upcycled products in terms of quality and price. Based on

comparable materials and handcrafted quality, the products in this study appear competitively priced, especially in the bag segment. Previous case studies on Freitag and Elvis & Kresse highlight the success of these enterprises, which suggests that labour-intensive upcycled goods production in a competitive market (e.g., bags) can be viable with high enough prices. However, this can require an ability to position the products in the luxury category. As research on sustainability suggests, the broader environmental and social sustainability practices of these two companies help them stand out as exemplary, and may well help make customers feel better about paying high prices. Freitag, as an early pioneer of upcycled bags, has become an upcycling icon over time, and for people visiting Switzerland, an iconic Swiss brand with an alternative vibe (Budgen, 2017).

Distribution models tend to reflect the relative scale of the enterprises. While most rely on self-distribution, a subset has demonstrated considerable success, as evidenced by their Instagram follower numbers. There appears to be a relationship between Instagram's success and the consistent, engaging quality of the posts. As a vehicle for the communication of design, creativity, and storytelling about past identity and sustainability ethos, the effectiveness of social media in general, and Instagram in particular, appears to be a key viability enabler. This aligns with previous findings on marketing effectiveness (Sung et al., 2022; Sung & Abuzeinab, 2022). On the other hand, Traels and OpNieuw! show the potential for selling to business and institutional markets, at least as an additional channel to pursue, as other companies such as Rebottled and Dvelas seem to be doing.

Identity, Connections and Location Set the Agenda

For micro enterprises, scaling up is fundamentally shaped by founders' self-identity, their vision of their project, and the resources at their disposal. Skater Florian Bürkle repurposes skateboards into stools, while cyclist Andy Gregg transforms bike parts into seating, and each benefits from their communities for material sourcing. Local partners play a crucial role in the success of sustainable business projects (Lewandowski, 2016; Sung et al., 2022), with waste material source partners being the first to align. Mark Howell's rainy London location makes lost or broken umbrellas an abundant waste material for him and the city's museums have been happy to provide him with a steady supply. After sourcing, building relationships with influencers or broader communities of interest provides paths for growth. For example, Dvelas founder Enrique Kahle is both a sailing enthusiast and an architect, giving him connections to each of those worlds and influencing the types of customers he has found as well as his production methods. Similarly, Markus and Daniel Freitag's background as cyclists informs Freitag's bag designs, and the company has always cultivated strong ties with this community through online engagement and live events, helping to give their brand its cult status. These elements collectively determine what upcyclers design, how they source materials, build networks, produce products, position themselves in the market, and scale their business

Contributions, Limitations and Future Research

This comparative analysis of furniture, lighting and bags made through repurposing expands on previous case studies, enabling the identification of a wide range of scalability and viability challenges and enablers across 20 cases/projects (involving 21 companies). This research provides insight into several aspects of furniture and object upcycling from the perspective of both design entrepreneurs and enterprises. Cases were selected based on upcycling through repurposing, so results should be considered specific to this area of upcycling. Information gathered was mainly secondary data based on the websites, social media channels, and, in some cases, articles on the companies. Interpretation of enablers and challenges was carried out based on the primary author's experience and tacit knowledge. In light of the crucial role of scaling up in enhancing the impact of upcycling, primary source research among upcycling enterprises on scalability and viability could assist in the quantification of success factors and the identification of additional feasible paths to scaling up. Expanding the scope to encompass other sectors where repurposing is happening, such as fashion and architecture, and other forms of upcycling, such as refurbishing and remanufacturing, would provide invaluable insights into the scaling up of these sectors and upcycling approaches.

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