

Circular Economy Business Models

Martin Charter

Director

The Centre for Sustainable Design®

UCA

United Kingdom

Introduction

This paper introduces issues related to circular economy business models and then provides some specific thoughts in relation to their potential applicability to polymer fishing nets and ropes. The section draws on research and thinking completed in relation to the development of Clause 6 'Guidance on circular business models' within a new pioneering guidance standard entitled BS8001 that focuses on '...implementing the principles of circular economy in organisations' (BSI, 2016)

Over the last 5 years there has been increasing discussion over green business models (Charter, 2013), sustainable business models (Clinton et al, 2014) and more recently, circular business models (Bocken et al, 2016, Renswoude, 2015). In particular, the literature on the circular economy business models has rapidly expanded over the last few years and there is the emergence of differing national and academic approaches that is creating a diverse range of terminologies. This is resulting in similar business model types often being defined differently.

Business Models

Business models are a key component of any transition towards a more circular approach in organisations. Discussion over circular economy business models is clearly linked to considerations of innovation. However, business model innovation is a 'whole organisation approach' focusing explicitly on value creation that goes beyond new developments or improvements in processes, products or services. That said, an organisation's ability to innovate is central to any transition to a more circular mode of operation and any new or re-engineered circular business model.

Business model development can be broken down into two main areas:

- New disruptive business models aimed specifically at the circular economy; and
- Hybrid business models embracing variants of both traditional and new disruptive business models aimed specifically aimed at the circular economy.

Central to implementation of circular economy (or circularity) in organisations is the need to distinguish between a business models and 'enabling mechanisms' which support value creation. For example, new production mechanisms (e.g. 3D printing, etc.) can support business model development, but do not represent a new business model per se, unless the organisation is solely involved in providing 3-D printing solutions (e.g. Object Form Ltd).

The value proposition is central to any business model, as it defines the products and services which create value for the organisation's customers. There is no definitive business model methodology however, most comprise four interconnected elements: *Who*, *What*, *How* and *When*. These elements are introduced below in Figure 1.

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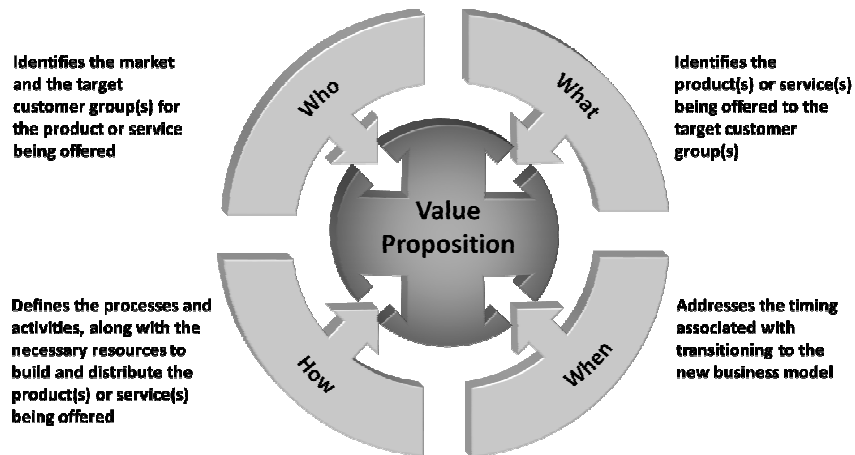


Figure 1 Overview of Business Model Methodology

Source: Clause 6, BS 8001 (BSI, 2016)

The key consideration for any organisation embarking on a transition from a linear to a circular economy approach will be to determine whether their current business model is appropriate to a more circular mode of operation. Firstly, the organisation will need to clearly understand its existing business model to determine whether, and if, innovation is required. However, there is no universal approach to implementing a circular economy approach within an organisation, as much is dependent on the specific products and services it produces and delivers, the markets it operates within, its position in the value chain and the level of organisational maturity (e.g. has it been in business for 1 year or 50 years.) For example, adopting a new disruptive business model may be possible for a start-up organisation; whereas for an established business, re-engineering the existing business model may be a more practical mechanism to transition towards a more circular approach.

Circular Business Models

As indicated above there are numerous references to circular economy business models that are now emerging in the literature. Following extensive research by Dr Stuart McLanaghan of Eden 21 <http://www.eden21.co.uk/> in relation to the development of Clause 6 of BS 8001 (BSI, 2016), six generic business model groupings were identified. These either explicitly relate to the circular economy, or reflect hybrid business models which have been tailored from existing ones. Below is a brief description of each, together with the key benefits, thoughts in relation to new opportunities related to waste polymer fishing nets and ropes (FNRs), and some initial ideas on the potential of 3D printing to waste FNRs as an 'enabling mechanism' at a local level.

- On demand
- Digitization
- Product life-cycle extension / re-use
- Remanufacture and manufacture from secondary materials
- Product as a service / Product Service System (PSS)
- Sharing economy and collaborative consumption

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Circular Economy Business Models and potentially applicability to Fishing Nets and Ropes

Circular Economy Business Models	Brief Description	Circular Economy Benefits, Potential Applicability to Waste Polymer Fishing Nets and Ropes (FNRs) and Possible 3D Printing (3DP) Opportunities (Hunt (2016) and Hunt and Charter (2016))
On Demand		
Produce on Demand (made to order)	Producing a product or providing a service only when consumer demand has been quantified and confirmed.	Benefits: Minimises raw material consumption and avoids over-stocking. FNRs: Produce FNRs based 'on demand' with assembly in ports and/or fishing communities 3DP: 3DP FNRs locally in ports and/or fishing communities (using virgin polymers and/or recycled filaments from FNR)
Digitisation		
Dematerialisation	Replacing physical infrastructure and assets with digital/virtual services.	Benefits: Minimises raw material consumption FNRs: N/A 3DP: N/A
Product Life-cycle Extension/Re-use		
Product life-extension	New products are designed to be durable for a long life-time.	Benefits: Landfill diverted through product life extension FNRs: FNRs using more durable materials ('design for longevity') 3DP: 3DP FNRs locally in ports and/or fishing communities (using virgin polymers and/or recycled filaments from FNRs)
Facilitated Re-use	Re-use with or without any repair/upgrade and supplied either free of charge (FOC) or resold.	Benefits: Landfill diverted through product life extension FNRs: Repair businesses and networks; re-use of FNRs in sports nets, construction applications, etc 3DP: N/A
Product Modular Design	Design product to be modular so that components are updated, but not the whole item.	Benefits: Landfill diverted through product life extension FNRs: modular fishing nets that are easier to disassemble and repair through modular net design 3DP: 3DP fishing net modules printed on demand

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Remanufacture and Manufacture with Secondary Materials		
Refurbish, remanufacture and recondition	Product gets a next life after remanufacture - the process of restoring the product or part functionality to 'as-new' quality; facilitated by design for disassembly. Enables the producer to put the products back into the market to earn a second, or subsequent income.	Benefits: Landfill diverted through product life extension FNRs: Implementing take-back systems to enable FNRs to be returned by fishermen to manufacturers or recyclers locally to re-manufacturing sites will be enable product life extension (incorporates localised mechanical or chemical recycling processes) 3DP: 3DP FNR modules printed on demand might be an enabler of remanufacturing
Manufacture by secondary material (value optimisation), including recycling	Creating products through secondary materials from recovered waste.	Benefits: Landfill diverted through product life extension FNRs: Products e.g. skateboards and sun glasses (using end-of-1 st life fishing net polymers) produced via extrusion moulding e.g. Bureo and waste bins, simple components, etc. producing through DIY recycling machines e.g. Precious Plastics 3DP: 3DP of products and/or product components using waste fishing net polymers e.g. Adidas concept training shoe midsole and Better Future Factory indicates other potential new opportunities
Incentivised return	Incentivises customers to return used/unwanted items back to the producer via a convenient system. Producer then either recycles materials or remanufactures the product.	Benefits: Minimises raw material consumption FNRs: FNR take-back scheme organised between the net manufacturers and fishermen – as part of contract manufacturers repair nets and/or re-utilise polymers into 2 nd life nets and/or other products 3DP: If materials separation at end of 1 st life, there is the potential to re-use polymers into original products or other products

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Product Service Systems – including Product as a Service		
Lease agreement	A lease (contract) is agreed between a lessor and a lessee for the hire of a specific asset (product / service.) Customers pay a recurring fee for the lease, usually monthly or annually, to gain access to a product/service. Can be B2B or B2C.	Benefits: Minimises raw material consumption FNRs: Fishermen lease nets from the manufacturers and pay regular fee for the use, repair and replacement 3DP: FNRs provide 3DP repair bureaus in ports or fishing communities
Performance based (Pay for Success)	Company delivers performance or defined results rather than the product/service itself. The customer purchases a defined level of performance, where the company's primary revenue stream comes from payments for performance delivered or demand-fulfilment.	Benefits: Minimises raw material consumption FNRs: Re-focus the FNR business model on providing efficient fishing catching solutions (by volume, by quality) rather than fishing nets per se; new payment systems need to be developed; net manufacturers ensure 100% availability of FNRs 3DP: FNRs provide 3DP repair bureaus in ports or fishing communities
Sharing Economy and Collaborative Consumption		
Peer to Peer (P2) rental	P2P rental of products/services between members of the public or between businesses; where the owner gains an income and the person renting gains cheaper access.	Benefits: Minimises raw material consumption FNRs: Owners of FNRs rent out their FNRs to other fishermen to improve utilisation; FNRs designed to be more durable 3DP: Pool of fishermen fund a community owned 3DP bureaus
Sharing Platforms/ Resources	Shared access or 'collaborative consumption' amongst users, either individuals or organisations. Enables increased utilisation of products and services by making possible shared use/ownership among consumers.	Benefits: Minimises raw material consumption FNRs: Fishing communities purchase or lease FNRs based on a 'shared value' and 'shared use' model 3DP: Pool of fishermen fund a community owned 3DP bureaus

Source: Adapted from Clause 6, BS 8001 (BSI, 2016)

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