The Circular Economy: The Circular Economy a key approach for addressing strategic challenges in supply chains

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The Circular Economy: A Key Approach for Addressing Strategic Business Challenges in Supply Chains

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Abstract

This paper considers the role that practices associated with Circular Economy approaches can play in enabling businesses to manage their supply chains in more sustainable ways. The belief that sustainable practices are inevitably detrimental to financial performance is challenged through analysis of a case study of a South African flower bouquet exporter whose business has been designed with full integration of Circular Economy principles. We evaluate the drivers for adoption of such Circular Economy strategies and highlight the need for ongoing multi-disciplinary research to support the development of effective sustainable innovations in supply chain practice.

Key words: Circular Economy, supply chain, sustainability, cut-flowers

1. Introduction

An array of challenges currently confronts businesses within the global economy. Arguably the most significant long-term challenges arise from climate change and broader environmental issues, such as the depletion of critical materials and the negative externalities resulting from ineffective waste management. Within this context an agenda related to sustainability has developed, backed by an array of green initiatives and legislative requirements. However, adoption of more sustainable practices within supply chains has not been as rapid or consistent as proponents of the green agenda would like to witness. There are many reasons for slow and uneven adoption, not least geo-political uncertainties, which impinge on long term decision making. A key reason for the slow transition to sustainable practices has been a belief that 'going green' necessitates a reduction in business efficiency and results in a negative impact upon the financial bottom line. The inception of the concept of the Circular Economy (CE), based around a mantra of 'reduce, reuse, recycle', is leading to a paradigm shift in approaches in supply chain management, resulting in an increasing focus upon the business benefits of deploying sustainable innovations. Research is playing a key role in elucidating the beneficial impacts of these new approaches and also illuminating the negative impacts of a 'business as usual' linear economy approach.

The objectives of this paper are: (i) to outline the most salient features of the concept of the CE; (ii) to demonstrate frameworks for the implementation of CE practices within business environments; (iii) to evaluate a case study of a firm that has integrated CE approaches throughout its operations; (iv) to propose future research agendas for the further rollout of CE.

2. Circular Economy (CE)

The CE concept is based on the premise that waste is eradicated within production cycles. The development of this approach can be traced back to the late 1970s when serious attention began to be paid to resource usage in supply chains. In recent years, CE has gained traction as an influential body of knowledge and as such it has become a popular topic amongst academic researchers, practitioners and policy maker (Webster, 2015). Influential organisations, such as the EU (EAA 2016), Ellen McArthur Foundation (2015), WRAP (2016), Circle Economy (2016), McKinsey and Company (2016), and Capital Institute (2016), have adopted CE as a central tenet of their operations. Two definitions of CE dominate within the literature. The first, as quoted by the Ellen MacArthur Foundation (2015), states, *"The circular economy is one that is restorative and regenerative by design and aims to keep products, components, and materials at their highest utility and value at all times, distinguishing between technical and biological cycles*". The second as articulated by Circle Economy (2016) states, *"A circular economy is one that is waste-free and resilient by design. It is a new economic model that is ambitious as well as practical. Designing the economy in a way that is restorative of ecosystems, ambitious with its innovation, and impactful for society, is a bold challenge but one that is achievable when guided by the principles of the circular economy"*.

CE could be disregarded as another yet another fashionable environmental buzzphrase from the same lineage as sustainability, green, environmentally friendly, recycling or ecology, but it has developed greater influence due to the focus on the scarcity of resources and their utilisation, values and recovery. CE has come to be a central plank of the sustainability agenda focussing upon sustainable production and consumption and waste elimination, leading to eco-design, design for recycling, upcycling/down-cycling, cascade models, reuse and remanufacturing, green production and logistics, and energy regeneration from materials (Gregson, et al. 2015; Singh & Ordonez; 2015; McKinnon, et al. 2010). Thus CE closes the "loop" of the "take-make-dispose" or "Cradle to Grave" (Braungart, 2002) approches, which have bedevilled practices within the linear economy.

A number of frameworks have been proposed in the literature which will enable businesses to mainstream CE practices within their operations. The Ellen MacArthur Foundation established a ReSOLVE framework, namely Regenerate (switching to renewable energy), Share (sharing and reusing assets), Optimise (resource efficiency and effectiveness), Loop (circular usage for longer life cycle), Virtualise (dematerialisation, e.g. switching online) and Exchange (promoting new technology, e.g. 3D printing). Four approaches to achieving a transition to CE are suggested, i.e. a new business model, new skills to reverse product life cycle, new capability to promote circular design, and be an enabler to provide a favourable environment for CE to work. Webster (2015) proposed a five-element framework to change production systems and products: design out waste; think in systems; think in cascades; build in resilience and energy from renewable sources. Circle Economy (2016) proposed six

principles to change a system towards CE: (1) Materials (to be cycled indefinitely), (2) Ecosystem (supporting activities and rebuilding natural capital, (3) Health (supporting human health and happiness), (4) Energy (deriving from sustainable/renewable sources), (5) Value (using resources to generate value on [non-] financial terms), and (6) Society (creating a healthy and cohesive living society and culture). Collectively, such initiatives have laid the foundations for the wider integration of CE practices into business operations.

3. Case study: Fynbloem

Here we present a case study which exemplifies how CE practices can be effectively integrated into a firm's operations, resulting in significant environmental improvements and also producing benefits for the financial bottom line. The case study illustrates how aspects of the frameworks outlined in the previous section can be operationalised. Table 1 below illustrates how the specific actions undertaken by Fynbloem link to internal and external drivers which influence the company's decision making.

Fynbloem is a rapidly growing exporter of indigenous flower bouquets based in the Western Cape of South Africa. It exports most of its product to UK retailers, especially Marks and Spencer but also has footholds in other markets around the world (Fynbloem 2014; 2015). As befits a company which deals in predominantly natural products Fynbloem has adopted strong sustainability credentials, which are compatible with the core tenets of circular economy practice. The company's environmental ethos is driven by a number of factors (i) the requirements of its main customer, Marks and Spencer whose Plan A programme demands that suppliers take strong account of sustainability indicators; (ii) cost savings resulting from building-in environmentally-focused technical specifications; (iii) creating resilience in the face of future uncertainties linked to climate change and the ability of utility infrastructures to deliver.

Fynbloem was set up as a business in 2009 and commissioned the building of a new packing facility in which locally harvested flowers are assembled into bouquets and packaged for export (Bek et. al 2016). The business is linked to a sister company, Bloemenkraal, which grows cultivated flowers on neighbouring land. Circular economy principles of reduce, re-use, recycle are central to the functioning of the facility. These practices can be seen in relation to management of water, waste and energy within the facility. Effective water management is critical as the Western Cape is an increasingly water scarce region and water provision infrastructure is inadequate. Given the dependency of the business upon water a range of systems have been implemented with the goal of attaining 'water neutral status'. These systems include installation of water tanks to collect and store rainwater, creation of reedbeds to filter waste water from the packshed so it can then be used for irrigation in the flower orchards and customisation of irrigation inputs through the use of software linked soil probes.

A range of features have been designed to ensure that energy demands are minimised. For example, the production area is located on the south facing side of the building and thus is not exposed to direct sunlight. Therefore less cooling is required to maintain a constant temperature of 10 degrees. Heat created during the refrigeration process is recycled to heat

the office areas when required. Anhydrous ammonia is used for refrigeration, which uses less energy than many other coolants and a solar dome was constructed into the roof to reduce the need for artificial lighting. The vast majority of waste generated at the facility is plant material, which is used as mulch on the orchards or composted. Green waste is also reduced by ensuring clear communication of technical standards to suppliers of flower stems. Thus, harvesters are informed of the quality standards required, so that stems are not rejected and are also encouraged to pick stems of specified lengths to reduce the quantity of material needing to be removed and disposed of in the packshed. This also reduces the volume of material needing to be transported, in turn reducing transport inputs/costs. Recycling of waste paper and plastic products is an important practice supported by a relationship with a local recycling company and training for staff to ensure that they are aware of the practices required to ensure that waste can be recycled efficiently.

The integration of these circular economy features into the design of the facility and its daily operations are crucial to the success of the business (Bek 2017). On the one hand they act as cost saving exercises which rapidly payback the initial investment costs, whilst on the other hand they futureproof the business against risks associated with energy price increases and water shortages. Regular management information reports are produced detailing performance in these key areas. This date is used to inform future practice with a view to continually improving environmental (and thus financial) performance. In addition, these measures are linked to ensuring high quality products for their customers.

Table 1: Fynbloem, CE Responses to Internal and External Drivers

Internal drivers	***CE Responses***
Value creation	*In-house product development (bouquet design)* *Constant communication with customers* *Input cost reductions (transport, heating, cooling, water management)* *Sustainability credentials build brand value*
Circular design	*Waste water to orchards* *Refrigeration heat to offices* *Plant waste to compost/mulch* *Building designed to optimise temperature regulation*
Waste reduction/elimination	*Improved product from suppliers* *Water neutrality* *Waste water treated for irrigation* *Hi-tech energy management*

	Precision irrigation *Staff training in production methods and waste management* *Transport minimised inc. sea-freight research (carbon footprint reduction)*
Reduce/re-utilise	*Waste water irrigates orchards* *In-built energy efficiency* *Plant waste to compost/mulch*
Increase quality	*Control over 'cool chain' to maintain freshness* *Staff training to reduce product rejects* *Precise product specifications sent to suppliers* *In house research on species deterioration rates*
External drivers	
SC collaboration/partnership	*Close relationships with suppliers* *Partnership with recycling company* *Relationships with customers*
Legislation	*National water policy compliance* *M&S Plan A standards*
Standardisation	*Building design to international Eco-standards* *Multi-award winning design and system management.*

4. Conclusion

The CE has emerged as a potent response to the environmental and economic challenges emanating from the linear economy paradigm. In a world of finite resources it is vitally important to develop strategies and technologies that seek to eliminate waste as far as possible and which maximise the value extracted from any given resource. Mindset shifts are required within business and policy contexts such that the benefits from sustainable CE strategies are recognised not just as a contribution to the greater good but also to the financial health of individual businesses. Our case study of South African flower bouquet exporter Fynbloem demonstrates that better use of input resources can directly and indirectly benefit the bottom line, whilst reducing critical risks to the company. Whilst initial investments may be greater, particularly in the pioneer phase of new cleaner technologies, these will help to cut costs in the medium to long term. Clearly a positive institutional context is an important facilitating factor as proven in this case by the standards expected by key customer Marks and Spencer. Interestingly in this case distrust in the ability of government

to secure utility provision (i.e. water and energy) also acts as a motivation to ensure efficient, renewable supplies of key inputs.

Going forward we would urge further research to elucidate, and where possible quantify, the benefits to be gained from adopting CE approaches. Such research is vital for making the case for further rollout of CE practices and to drive research and development into new technologies and operational strategies. Furthermore, this research needs to be complemented by work which critically examines the efficacy of individual practices labelled as CE. The sustainability field has been bedevilled with examples of innovations and strategies, such as the push for diesel vehicles, which have later been shown to have detrimental impacts. Multi-disciplinarily within research teams is essential for ensuring that proposed technical solutions are subject to wider evaluation before being propagated to the business community as CE solutions.

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