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## The Pro-Circular Change Model (P-CCM): Proposing a framework facilitating behavioural change towards a Circular Economy

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## ABSTRACT

A Circular Economy is an economic and industrial system where resources are kept in use for as long as possible. This system is an alternative to the “take-make-use-dispose” path which is followed in many industries. Businesses can adopt a circular approach to production by implementing a range of alternative business models. These models require consumer acceptance, however a number of behavioural barriers are currently preventing the development and adoption of a Circular Economy. There is little research on behaviour change with specific regard to the Circular Economy. This is due to the concepts’ multidisciplinary scope which makes data collection methods expansive and challenging.

The Pro-Circular Change Model (P-CCM) is a novel theoretical framework, which uses a Theory of Planned Behaviour (TPB), Pro-Circular Values (P-CVs) and Persuasive Communication (PC) to identify and influence behaviours that can support the development of a Circular Economy. For the purpose of the model, behaviours that are brought about due to the prioritising of resource-efficiency were defined as Pro-Circular.

### 1. Introduction

The linear economy was established in the early days of the industrial revolution and is still prevalent in a significant majority of industries to date. It is based on the “take-make-use-dispose” system, where products are made, used and disposed of at the end of their life. This system can lead to resource overuse, waste and is founded on the naive assumption of an infinite material supply. While its practice is common, governments (European Commission, 2015a; DEFRA, 2015) and businesses are beginning to realise the potential and “importance of moving to a more sustainable economy” (DEFRA, 2015, p. 2).

An alternative to the linear model is a Circular Economy. A Circular Economy is an economic and industrial system where resources are kept in use for as long as possible. In contrast to the linear economy it can eliminate waste, reduce environmental impacts of production and consumption, and provide resource security. It also has the potential to generate more jobs and sustain a competitive and growing economy (European Commission, 2015a).

The concept of a Circular Economy was first initiated by Walter Stahel in the 1970’s. Stahel emphasised the importance of extending the lifecycle of products, as a way to achieve a more sustainable economy.

As shown in his closed-loop framework, this is a result of consistently reusing, repairing, reconditioning and recycling products and components (Stahel, 1982). In the 1990’s, the Circular Economy was again advocated by McDonough and Braungart, who were proponents of the Cradle to Cradle. This approach focuses on closed-loop design and manufacture, however extends Stahel’s concept of the Circular Economy to consider biological products. McDonough and Braungart, divided the Circular Economy into two distinct cycles – for biotic and abiotic products (McDonough and Braungart, 2002). In recent years, the Circular Economy has been advocated by authors such as Pauli (2010) and Thackara (2015). Both, Pauli and Thackara, emphasised the need to shift towards a more sustainable and natural economic system. Since 2010, the concept has been championed by the Ellen MacArthur Foundation, who work with businesses, governments and academia to engage decision makers and leaders in the Circular Economy framework.

Businesses in the abiotic sector can adopt a circular approach to production by implementing a range of alternative business models, such as: product-service systems (PSS), sharing platforms, maintenance and refurbishment or remanufacture (APPSRG and APPMG, 2014). However, many businesses do not have sufficient knowledge of the

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above models to confidently divert away from the current linear-based norm (European Commission, 2014; Rizos et al., 2015). This knowledge gap results in many businesses overlooking the financial benefits and competitive advantages that a Circular Economy can bring (Ellen MacArthur Foundation, 2012). Some businesses may be cautious about how their end-user will respond to changes in their business models, which is also due to a lack of knowledge and familiarity with Circular Economy. For example, products that are remanufactured or refurbished, are often wrongly perceived by the consumer to be of lower quality (APPSRG and APPMG, 2014), when this is not the case. Furthermore, implementation of Pro-Circular Behaviour (P-CB) is often disregarded due to the benefits (e.g. resource security, waste reduction) not being immediately apparent (Atherton, 2015).

There is currently a lack of research on consumer behaviour in regards to the Circular Economy (Ellen MacArthur Foundation, 2013). Data collection on this is still in its infancy due to its challenging (Atherton, 2015) and multi-disciplinary scope. Consequently, organisations such as the World Bank (2014) has called for further research into the influencers of psychological change in resource consumption.

This paper encourages further research into behaviour change by proposing a novel behavioural change model – The Pro-Circular Change Model (P-CCM). This theoretical model identifies a core set of behaviours and values that can identify an individual as being Pro-Circular. The model also shows how to design more effective interventions to encourage and promote Pro-Circular Behaviours in target groups.

## 2. Pro-Circular Behaviour (P-CB)

Many experts agree (e.g. European Commission, 2015a; DEFRA, 2015; Atherton, 2015; Ellen MacArthur Foundation, 2013), that moving to a Circular Economy requires change to how people produce and consume products. Adoption of circular business models (e.g., remanufacture, maintenance service, product-service-systems) by both producers and consumers, can lead to favourable behaviours and advantageous outcomes (APPSRG, 2014; Ellen MacArthur Foundation 2013). Examples of such corresponding behaviours and outcomes are shown in Table 1.

Literature on the Circular Economy frequently discusses behaviour change (e.g., The CIWM, 2014; The Scottish Government, 2016). However, to date behaviour has not been identified and defined in the Circular Economy domain. To distinguish specific behaviours that support the development of a Circular Economy, authors of this paper propose to define Pro-Circular Behaviour (P-CB) as *an action which is brought about due to prioritising resource-efficiency. This behaviour benefits or at least reduces damage to the environment, economy and society.* In the abiotic Circular Economy system, these behaviours can be reusing, repairing, refurbishing, remanufacturing, recycling and borrowing or leasing products.

The Pro-Circular Behaviour shares some of its characteristics with an existing Pro-Environmental Behaviour. As per definition, the Pro-Environmental Behaviour is a kind of behaviour which “consciously seeks to minimise the negative impact of one’s actions on the natural

**Table 1**  
Pro-Circular Behaviours – parallel examples and shared social, environmental and economic impacts.

Producer offerings	Consumer behaviour	Shared outcomes
Remanufacturing products	Buying remanufactured products	Reduction of waste and air, water and soil pollution; more education, training and job opportunities; innovation and growth of local businesses
Repair and maintenance service	Extending life of owned products	
Product-service platforms	Sharing products	

and built world” (Kollmuss and Agyeman 2002, p. 240). Nonetheless, the Pro-Environmental Behaviour concentrates purely on the environmental impacts of one’s action, omitting the economic and social factors. Pro-Circular Behaviour seeks to adopt these omissions and to include the economic and environmental factors.

Pro-Circular Behaviour is the kind of behaviour the Pro-Circular Change Model aims to engender.

## 3. The Pro-Circular Change Model (P-CCM)

The Pro-Circular Change Model (P-CCM; Fig. 1) is a conceptual framework that aims to encourage the adoption of Pro-Circular Behaviours. The framework could help to change consumer and organisational behaviours that are not considered beneficial to the development of a Circular Economy.

The framework can be used to campaign for behaviour change within targeted consumer groups that share similar characteristics, values and attitudes. The desired result being a change in the targets unfavourable behaviour towards the purchase, use or even disposal of a product. In this context, an unfavourable behaviour is a kind of action that shortens the lifecycle of a functional product or a component. For example, the demand for new products shortens the lifecycle of potentially repairable or remanufacturable products.

The framework could be used to encourage behaviour in a given industry. For example, in the retail refrigeration industry, manufacturers could use the P-CCM to encourage supermarkets to purchase remanufactured equipment. Similarly, in the computing industry, manufactures could use P-CCM to encourage individual consumers to purchase refurbished equipment. In practice, the P-CMM would be used in marketing communications and materials, such as adverts, emails or presentations. It is important, that the marketing interventions are strategically developed and delivered to target a specific segment of population in order to engage in a behaviour change more effectively (Mckenzie-Mohr, 2000).

A shift in consumer behaviour can be a catalyst for producers and distributors to change their offerings and business models. The framework focuses on how the P-CCM could support the closed-loop production of technical goods, rather than biological goods in the Circular Economy. The P-CCM applicability to the biotic loop requires further investigation.

### 3.1. How the P-CCM works

The suggested model functions on the basis that an intention to perform a Pro-Circular Behaviour is first identified by those wishing to encourage it and then favourably stimulated to instigate the behaviour change. It contains three key elements (Fig. 1): Behavioural Intention (BI), Pro-Circular Values (P-CVs) and Behaviour Change Intervention (BCI).

The first construct of the model, the Behavioural Intention (BI) uses the Theory of Planned Behaviour (TPB; Ajzen 1991) to measure a probability of performing a Pro-Circular Behaviour by an individual or a group. The second part of the model, which is the Pro-Circular Values (P-CVs) stage, identifies social, economic and environmental values held by a subject. The last stage of the P-CCM aims to initiate Pro-Circular Behaviours by utilising factors underlying the identified intentions (BI) and values (P-CVs) in the Behaviour Change Interventions (BCI).

The constructs of the P-CCM are explained in Sections 3.3, 3.4 and 3.5.

### 3.2. Why the P-CCM could be successful in supporting Pro-Circular behaviours

The P-CCM adopts the rules of the well-grounded Theory of Planned Behaviour (TPB). Though, proven to be a reliable predictor of

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