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A Circular Business Model (CBM) Acceptance Framework

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An emerging theme within circular economy (CE) research is about circular business model (CBM) that deals with development of new business models that satisfies the triple bottom-line (economic, social, and environmental) aspects of sustainability. However, there exist a gap in understanding the preparedness of consumers to accept CBMs no matter how much circularity they possess. This article explores the present state of circular economy (CE) concept and circular business models (CBM), barriers for adoption of such CBM, and attempts to answer the question of consumer preparedness through a framework for CBM acceptance. The main contribution for this paper is to provide a framework for evaluating and appropriating circularity of business models in accordance to the pattern of consumption for a given product or service. We also offer an application of this framework to supply chains by using "tragedy of commons" theory to explain the CBM acceptance rationale of supply chain/value chain partners.

KEYWORDS: Circular Business Models (CBM), Circular Economy (CE), Linear Economy, Sustainability, Consumerism, Tragedy of commons theory

INTRODUCTION

In 2015, the United Nations reported that the present world's population (7.5 billion, 2017) is projected to become 9.7 billion by 2050 (UN DESA Report, 2015). This demographic growth must be thought provoking not only for economists, but also policy-makers, that the global economy must also grow at a similar pace, and sustain thereafter. The contradiction lies in our consumption pattern. Traditionally, only 20% of the materials used for the first time goes back for reuse and remanufacturing (Sempels & Hoffmann, 2013). In the past decade, this economic misbalance due to growing surplus of people and scarcity of natural resources and ecological systems has emerged as a strong force for shifting from the prevailing linear economy towards a circular economy (CE) globally. The EMF 2014 report expressed that this shift would not only save natural resources, but would also create an opportunity of over 1 trillion USD for the global economy (EMF, 2014). Similar other empirical findings have formed awareness among several large and small corporations to become prime actors of this likely revenue drive (Planing, 2017).

One of the ingrained ideologies of a circular economy is about findings ways to translate today's goods into tomorrow's resources (Stahel, 2014). The decline in linear economy and growth in circular economy can be greatly predicted from simple statistics. The raw material prices for commodities are constantly rising and becoming increasingly unpredictable (See figure 1, Lee et al., 2012). In addition, inconsistent demand and supply patterns for several resources, e.g., metals and crude oil, have created a long-term resource scarcity in last few years (See figure 2, Lee et al., 2012). Apparently, such drifts have generated strong influence on firms to recover raw materials from consumers when they intend to dispose the product.

This resource preservation concern to sustain resource supply has fired the notion of circular business model (CBM) for firms, i.e., introducing circularity in their respective business models. Following traditional definitions of business models (BM) (Zott & Amit, 2008; Osterwalder & Pigneur, 2010), circular business model is not only about creating value for the firm and its customers, but also for the society and ecological system it belongs to.

Figure 1 – Volatility in commodity markets, 1980–2012
(Adapted from Lee et al., 2012)

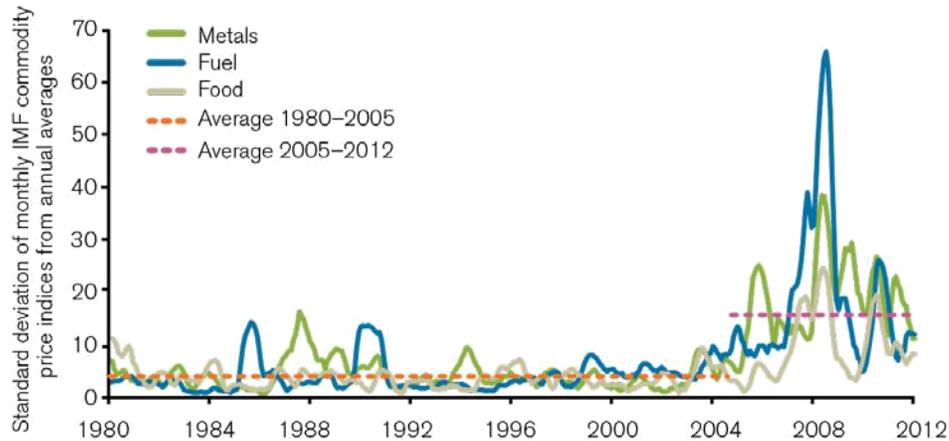
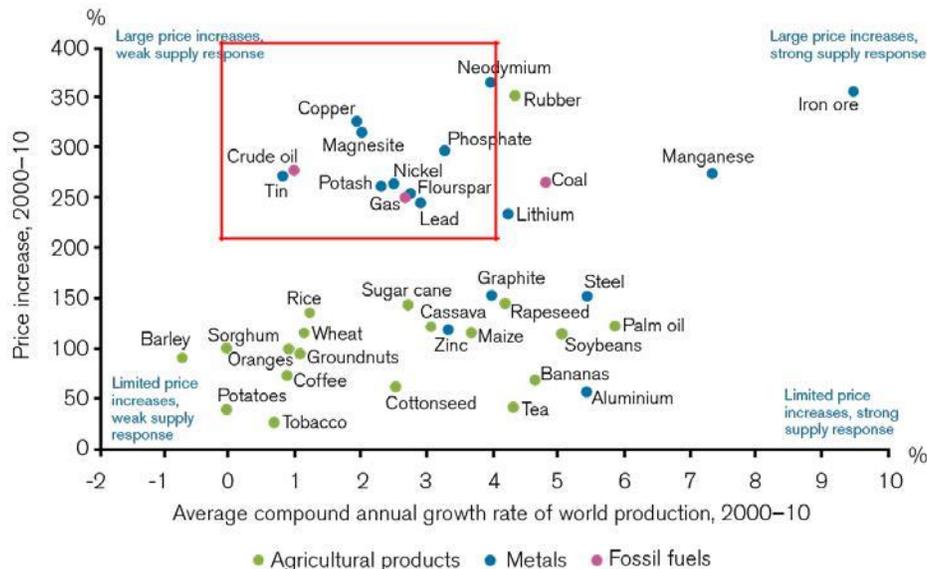


Figure 2 – Price increases and supply growth for various commodities, 2000–2010
(Adapted from Lee et al., 2012)



A growing stream in CE research is about CBM in the context of material and product designs, newer business models, value chain networks, and potential enablers (Planing, 2017). However, there exist a gap in understanding the preparedness of consumers to accept CBMs no matter how much circularity they possess. In this study, we aim to focus on understanding the present

state of circular economy and associated business models, barriers for adoption of CBM, and attempt to answer the question of consumer preparedness through a framework for CBM acceptance. The main contribution for this paper is to provide a framework for evaluating and appropriating circularity of business models in accordance to the pattern of consumption for a specific product or service.

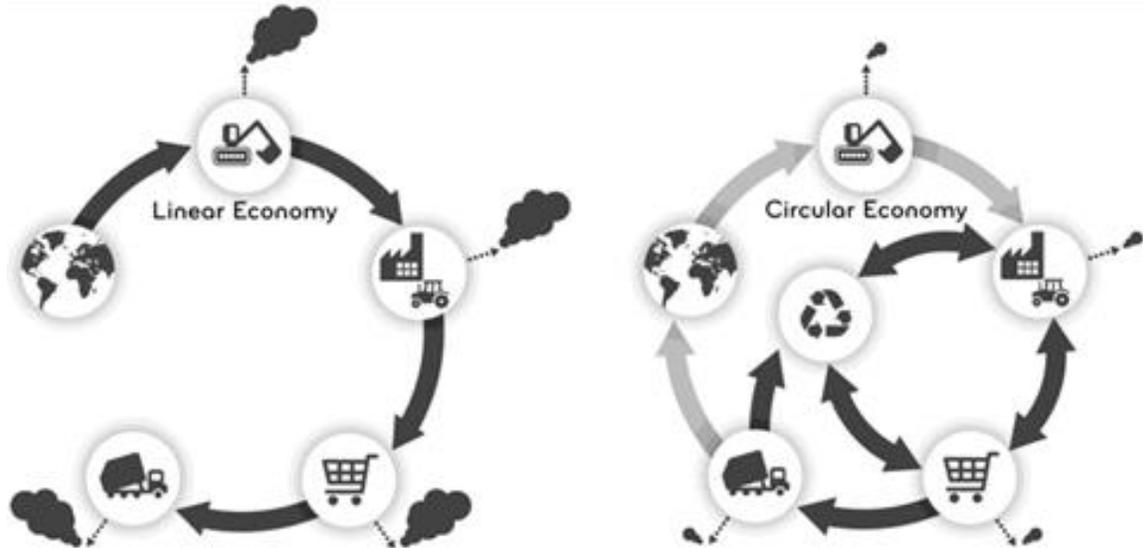
The structure of the paper is as follows. In the next section, we provide a brief overview, key ideas, and common understanding in the literature about the concept of CE, CBM and most importantly the adoption barriers from consumer perspective. We, then, proceed to present the proposed acceptance model for CBM from consumers' readiness perspective and an entropy method to classify and index CBMs. How this proposed framework can be operationalized and studied by researchers and practitioners are explained. We also offer an application of this framework to supply chains by using "tragedy of commons" theory to explain this behavior of the supply chain/value chain and conclude by stating the usefulness and limitations of this study.

CIRCULAR ECONOMY AND CIRCULAR BUSINESS MODELS

Since the industrial revolution, the linear economy model has dominated our society, but, is increasingly becoming obsolete (Antikainen & Valkokari, 2016). It is a simple Take-Make-Consume-Waste model that favors economic objectives, but, pays little to no attention to societal and environmental harm caused due to pollution generated at each stage. The aftermath of linear economy model is undesirable. World has realized that our earth has finite key resources, and landfilling or dispersion of wastes generated by linear economy model keeps contaminating our ecological system. As an alternate model of production and consumption, CE has emerged in the past decade that thrives by ensuring closed loops at each stage to avoid extraction of new resources for production and to prevent landfilling or dispersion of generated wastes (EMF, 2014; Lewandowski, 2016). The concepts of CE and closed-loop supply chains (CLSC) are similar, however, CE incorporates all approaches related to the triple-bottom line (3BL) aspects of sustainability – economic, environment, and social – at planet level as opposed to CLSC's emphasis on economic and environment at firm level (Despeisse et al., 2012; Govindan et al., 2015; Leigh & Li, 2015; Tonanont et al., 2008). CE suggests a method to reduce dependencies on new raw material by creating substitutes through reuse and recycling. It is an accelerating mission that allows us to secure a better tomorrow for ourselves and our future generations by improving our abilities for sustainability (Sauve et al., 2016). A contrast of linear and circular economy concepts is presented in figure 3 below.

There are five CE principles to operationalize the concept of CE (EMF, 2013) – (a) Design out waste, (b) Build resilience through diversity (balance efficiency with adaptability), (c) Shift to renewable energy sources, (d) Think in systems, and (e) Think in cascades (Mentink, 2014). These principles are derivatives of prior conceptualizations such as extension of product life by treating products as services (Stahel, 1997), treating waste as value-adding resource (McDonough et al., 2003) and industrial symbiotic ecosystem (Graedel & Allenby, 1995). The interesting part about these principles is about its popularity and adoption by enterprises, consulting firms, policymakers, academicians and governments in both Europe and China (Sauve et al., 2016). The principles of "Design out waste" and "Thinking in systems" refers to idea of performance-based or use-based systems or regenerative processes for products to minimize consumption of scarce material and energy (Stahel & Reday-Mulvey, 1981), or to renew its source of energy and material (Lyle, 1996). An example would be to re-furbish and resale of used cars or electronic products. "Building resilience" refers to the idea of development of sustainable and self-sufficient ecosystems such as permaculture (i.e., agricultural ecosystems intended to be sustainable and self-sufficient) (Mollison & Holmgren, 1978). "Shift

Figure 3 - Contrasting the linear and circular economy concepts
(Adapted from Sauve et al., 2016)



to renewable energy sources" is not a part of transition to CE, but is about using renewable energy, such as wind mills or PV panels, at earliest possible juncture. "Think in cascades" refers to the principles of Blue Economy such as developing innovative ways to use one's waste as another's income (Pauli, 2010).

Although CE allows us to vision a world without any waste, but, it is realistically dangerous to counter that a 100% CE is possible with our current patterns of consumption, and need for input material, both raw and technical. There are several reasons to claim that is not possible to create a 100% CE at least in near future. First and foremost, 100% CE requires fully closed rings to avoid material loss. Ideally, this would require sophisticated recollection mechanisms, not only at appropriate junctions of the product value chain and beyond that to recollect last mile wastes. For example, is it economically viable to aim to recollect every coke can dumped by ignorant adventurers in the Rocky Mountains? Such a system would become unnecessarily cost and labor intensive as well as technologically complex to implement. An alternate option would be to suggest methods to generate ecologically degradable waste and or avoid generating waste at all (e.g., coke vending machines in the Rocky Mountains), which is again far from reality. Second, the notion of fully closed rings for 100% CE suggests there is no need of any input material. In other words, it suggests that all out material must become input material. Contrastingly, the alarm rate of population growth (UN DESA Report 2015) indicates no remorse but continued need for more input material to meet global production demand, unless scientists make miraculous innovations to normalize input requirements. Third, the notion of fully closed rings suggests rings within rings to balance input and output materials. However, there is a lifespan for any physical material on its number of reuse and/or recycle. For example, drink-safe re-usable glasses/bottles also become unusable after a while and need replacement (i.e., need for new input material arises even when the intent is to achieve 100% circularity). Four, the energy requirements to manage fully closed ring are unexpectedly high. An argument in support of renewable energy may be economically viable to deploy.

Circular Business Models

While CE offers countless business opportunities by creating closed loops for both current and new players, an unresolved dynamism persists in the patterns of consuming and role of consumers (Antikainen & Valkokari, 2016). CE has the potential to disrupt the prevailing associations of consumers with products and services. For example, Netflix has changed the concept of buying physical media of music and videos (i.e., pay-for-ownership) to the concept of buying access and performance (i.e., pay-per-use). Such transformation in consumerism not only shall accelerate CE, but also, incentivize firms to co-create products with users that have longer service life and lesser impact on ecological system (Tukker & Tischner, 2006). This notion of CE forms the basis to develop circular business models (CBM).

A business model is defined as “*a conceptual tool that contains a set of elements and their relationships and allows expressing a company's logic of earning money. It is a description of the value a company offers to one or several segments of customers and the architecture of the firm and its network of partners for creating, marketing and delivering this value and relationship capital, in order to generate profitable and sustainable revenue streams*” (Osterwalder, 2004 p. 43). It is regarded as a template that describes how a firm carries out its business, how it distributes value to its stakeholders” (e.g., the focal firms, customers, partners, and so on), and how it connects production and markets (Zott et al., 2011; Aspara et al., 2013). The choice of an appropriate business model is a crucial business decision as firms develop new products and services or reposition their existing products and services into new markets. Firms regularly require novel business models to readjust their structures and processes in order to refuel their products, services, or market strategy (Chesbrough & Rosenbloom, 2002). A firm's business model can serve as an important point of innovation and a vital source of value creation for the firm and its stakeholders (Chesbrough, 2011; Teece, 2006). Scholars and business practitioners are increasingly recognizing the importance of designing and execution of the business model as a potential source of competitive advantage and a central factor in explaining firm performance (Markides & Charitou, 2004). In this background, the business model as a mediating construct between a firm's capabilities and its performance is emerging as a new unit of analysis in the academic literature (Osterwalder, 2004). The business model as a unit of analysis is not about the product, the firm, the industry, or the network; while it is centered on a focal firm, its borders are broader than those of the firm; it highlights for a systematic and holistic approach to explain how a firm conducts its business (Zott et al., 2011).

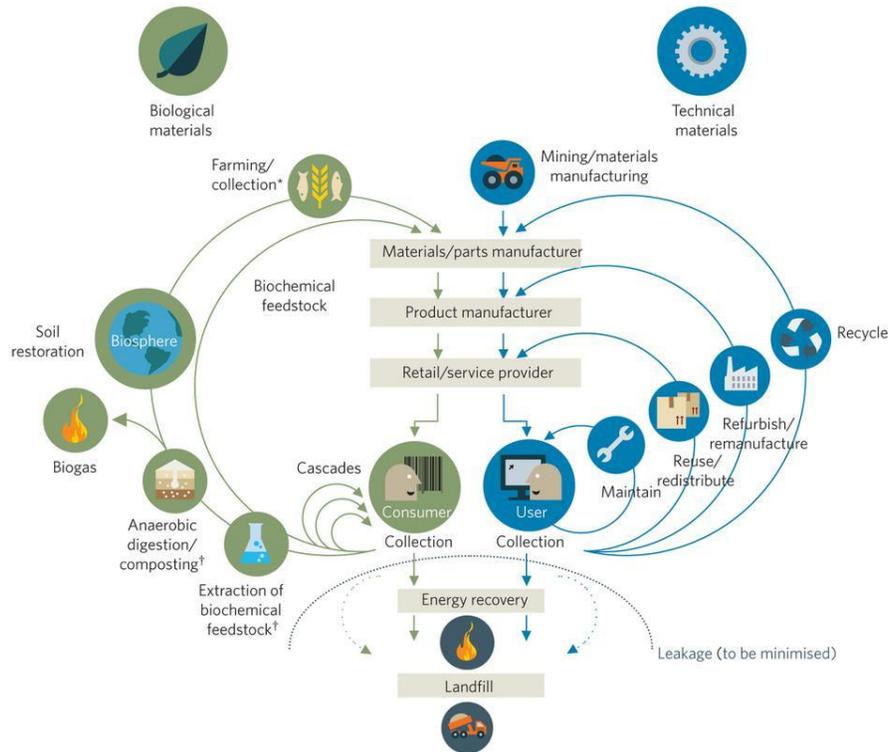
Although the notion of CE was introduced several decades ago (e.g., Stahel & Reday-Mulvey, 1981; McDonough & Braungart, 1992), systematic efforts to transform this notion of circularity within business models is highly limited. There are several reasons that might have deterred this transformation, such as prevailing patterns of purchase and consumption, necessity for new production methods (reverse engineering, upgrade, remanufacturing), and so on. Based on theoretical understanding of BM, the CBM may be considered as those BMs that are economically viable even after adding circularities in the business system for recollection, restoration, reuse or similar outcomes with the material chain. Such circularities may be present internal (i.e., reuse by itself) or external (i.e., reused by another business model as input material) to the overall system. The present state of CE literature suggests that there is no common understanding about the designing a stable system neither in time, space or industry. A review of the extant literature suggests a clutter set of ideas for adding circularity in business models – all targeted for efficiency enhancement, longer use, recovery, energy recovery or their combinations upon the product or its parts. Table 1 provides an overview of the literature and respective suggestions to add circularity in business models. Figure 4 (adapted from EMF, 2013)

is an illustrative depiction of how (and at what stage) circularity can be introduced to create closed material cycles in business models to the greatest possible extent (EMF, 2013).

Table 1: Overview of literature and suggestions to add circularity in business models

Authors (Year)	Suggested circularities in business models
<i>Stahel & Reday-Mulvey (1981)</i>	Product life extension (through re-use, re-manufacturing, Maintenance); Recycling (through reusing materials at micro-level)
<i>Damen (2012)</i>	Maintenance; Repair; Reuse; Refurbishment; Remanufacturing; Recycling; Energy recovery
<i>Circular Economy Toolkit (2013)</i>	Product as a Service; Design, Manufacture and Distribute; Usage; Maintain/ Repair; Reuse/ Redistribute; Refurbish/Remanufacture; Product Recycling
<i>Lacy et al. (2014)</i>	Products as services; Next life sales; Product transformation; Recycling 2.0; Collaborative consumption
<i>Bakker et al. (2014)</i>	Classic long-life model; Hybrid model (combine durable product with short-lived consumables); Gap-exploiter model (components of products that last longer than the rest); Access model (customer pays for access to product); Performance model (customer pays for performance instead of product)
<i>Mentink (2014)</i>	Maintenance; Repair; Redistribution (or reuse without treatments); Upgrading; Remanufacturing; Recycling; Energy recovery; Disposal
<i>Van Renswoude et al. (2015)</i>	Short cycle; Long Cycle; Cascades; Pure circles; Dematerialized services; Produce on demand
<i>Wrap (2017)</i>	Product Service System; De-materialized services; Hire & leasing; Collaborative consumption; Incentivized return & re-use; Asset management; Collection of used products; Long life; Made to order; Bring your own device

Figure 4– Overview of adding circularity in business models
(Adapted from EMF, 2013)



The reasons for adding circularity in business models can be attributed that acts as adoption barriers of CBM are infested in the consumer side as well as from the producer side. There are at least two reasons that follow the consumer perspective of viewing CBM's tenacity: (a) Customer rationality, and (b) Inadequate social diffusion/awareness. Customer rationality originates from their behavior about "how they choose, protected, use, and dispose products, services, experiences, or ideas to satisfy their needs and wants" Kuester (2012). Most often, they are willing to pay a price for a product that can satisfy their immediate requirement, and reject the more expensive alternate even if it is more durable. Also, customers show inclination towards owning the product even if they understand that the product may not be used quite often or extensively. Inadequacy in social diffusion/awareness occurs due to differential economic environments across nation. In today's global economy, the supply chain of products is not restricted to one countries. Some of the hosting countries may not impose higher rents to the product manufacturers, in order to balance the ecological harms. As a result, the product is available at a cheaper price and buyers tend to dispose such product quite frequently. For example, American apparel firms manufacture in China to make apparels available at lower prices, but, the consumer in the US is unaware of the social harm it may or may not have caused while producing it in China.

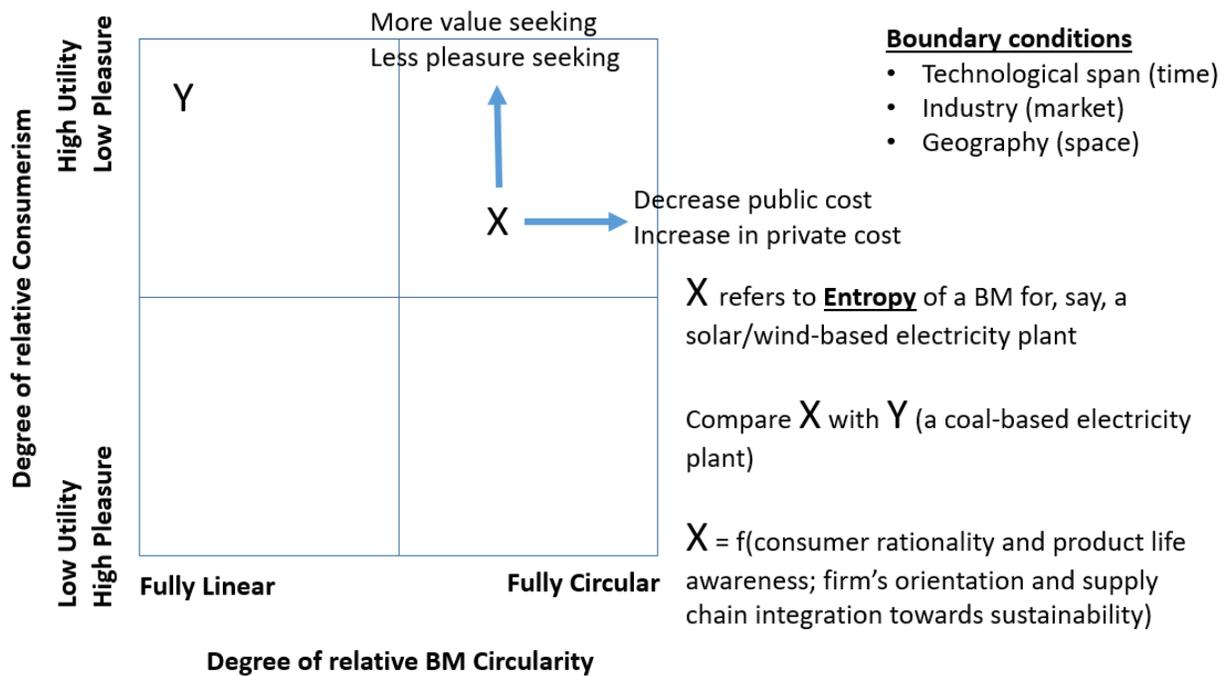
From the producer perspective, there are at least two reasons that works as adoption barriers: (a) Organization's short-term orientation, and (b) Profit-share divergence between supply chain members. An organization's short-term orientation can be blamed on its management' beliefs, such that the management may not be willing to make large investments needed to modify its existing linear into circular business models, or to retain products as assets for short, long, pure, cascade or similar cycle business models (e.g., pay-per-use or performance-based contracts).

In addition to it, disparities in profit share within supply chain members is also a key reason that act as adoption barrier towards adding circularity. For instance, the firm that sells a finished product capitalizes more than other supply chain members when it turns out to be a good design upon hitting the market. Instead, if the same product is designed in such a way that it comes back to the supply chain members for recycling and/or remanufacturing, it would balance out the profit-share divergence. As a matter of fact, most consumer products are not designed in such a way that they have an after-use life through repair and remanufacturing models.

CBM ACCEPTANCE FRAMEWORK

The CBM acceptance framework presented in this section can explain consumer preparedness for acceptance of CBM. The primary purpose of this framework, depicted in Figure 5, is to facilitate the evaluation and addition of circularity in business models according to patterns of consumption for a specific product. This framework proposes that the “entropy” of the business model for a given product, or simply, the measure of imperfection of the business model design to produce a given product (or service) is a function of (a) degree of relative consumerism, and (b) degree of circularity of the business model for a given product, within certain boundary conditions, such as industry, technological trend, and geographic location.

Figure 5 – Proposed CBM acceptance framework



This framework can make appropriate evaluation and predictions only when the interaction of consumerism and circularity in business models are *bounded (boundary conditions)* for a given industry (e.g., music industry), a given technologically overlapping span (e.g., DVD versus MP3, or a given geographic concentration (Western versus Eastern flavor for music).

An abstract disposition of consumerism is about the unrestricted choice that consumers exercise while choosing products and services, which in turn guides the producers,

manufacturers, and providers to decide upon what to produce and how to produce. As a phenomenon, it enables a society's economic system in place. Much of the extant research is about examining issues that consumers consider in making their choices, such as what factors do consumers consider and what effect does it have on the markets (Dhar & Simonson, 1999). For example, research shows that, most often, consumers do not make good choice due to factors such as choice making in isolation or over considerations, or in balancing between utility and pleasure (Kahneman, 1994). An illustrative example could be about selecting a meal at a restaurant that requires consumers to make a decision that requires consideration for health or taste or balance of both. In the context of the proposed framework, such factors can be perceived as two extremes of consumerism – utility, pleasure, or a balance of both. However, the perception of consumerism sits in consumers' mind – based on (ir)rationality and (un)awareness of the Triple Bottom Line (economic, environmental, and social aspects; Elkington, 1998) they have membership for, hence the term *relative consumerism*.

The concept of linearity and circularity are not just the two sides of the coin; rather they are linked to each other; thus, circularity in BM is relative (*relative circularity*). The notion that earth has unlimited capacity to provide virgin input materials and absorb waste is not valid any longer. With increasing environmental awareness, linear models cannot survive ignorantly and nonchalantly. To save corporate investments or external pressures, policy-makers and corporations suggest “linear” sustainable development initiatives (Sauve et al., 2016) to improve their environmental performances, but, such efforts become questionable as efforts of sustainability or tokenism (Elkington, 1994). Such measures are initiated to control wastes by focusing on downstream processes of production, such as may waste reduction, recycling and pollution reduction, and so on. As such, the products manufactured from such recycled inputs typically have no consumers because they evidently do not have appropriate value chain in place. Contrastingly, the notion of circular business models comes into play when sustainability measures are considered as failures to save linear business models. As such, CBMs are resource-focused since they consider both inputs and outputs not only at firm-level, but also, for the entire value chain of the production process, with high degree of emphasis on waste control. To ingrain this concept of CBM, all stakeholders of the production process must understand economic gains earned in association with resource depletion and pollution is private, but by incurring public costs to society and environment (Sauve, 2016). For instance, over-speeding cars are stopped not only to avoid harm to the driver, but also, to other commuters on the motorway. Adding circularity in business model is therefore a genuine effort to address the public cost issues at firm, value-chain, industry, regional, or global levels.

Therefore, the logic of relative consumerism and relative BM circularity suggest the follow propositions.

P1. Subject to a given industry or technological span or geographic concentration or combination of two or all, higher consumer (ir)rationality and (un)awareness about a product's potential impact on economic, environmental, and social impact will lead to higher inclination for utility(pleasure) seeking behavior.

P2: Subject to a given industry or technological span or geographic concentration or combination of two or all, higher private (public) cost in producing a given product will lead to adding greater circularity in its given product.

In management, social sciences and physical sciences, diffusion of a given phenomenon can be measured using the “entropy method”. It is concerned with measures of ‘evenness’ of ‘similarity’ (Proops, 1987). In physical science, it refers to the directionality of heat transfer mechanism. In

management science, it is a methods to quantify the distribution of a particular phenomenon across several parts, such as industries, technological overlaps, geographies (Raghunathan, 1995). For example, Jacquemin-Berry entropy measure is well regarded and highly applied method to measure a firm's level of diversification or diversification type (Jacquemin & Berry, 1979; Palepu, 1985).

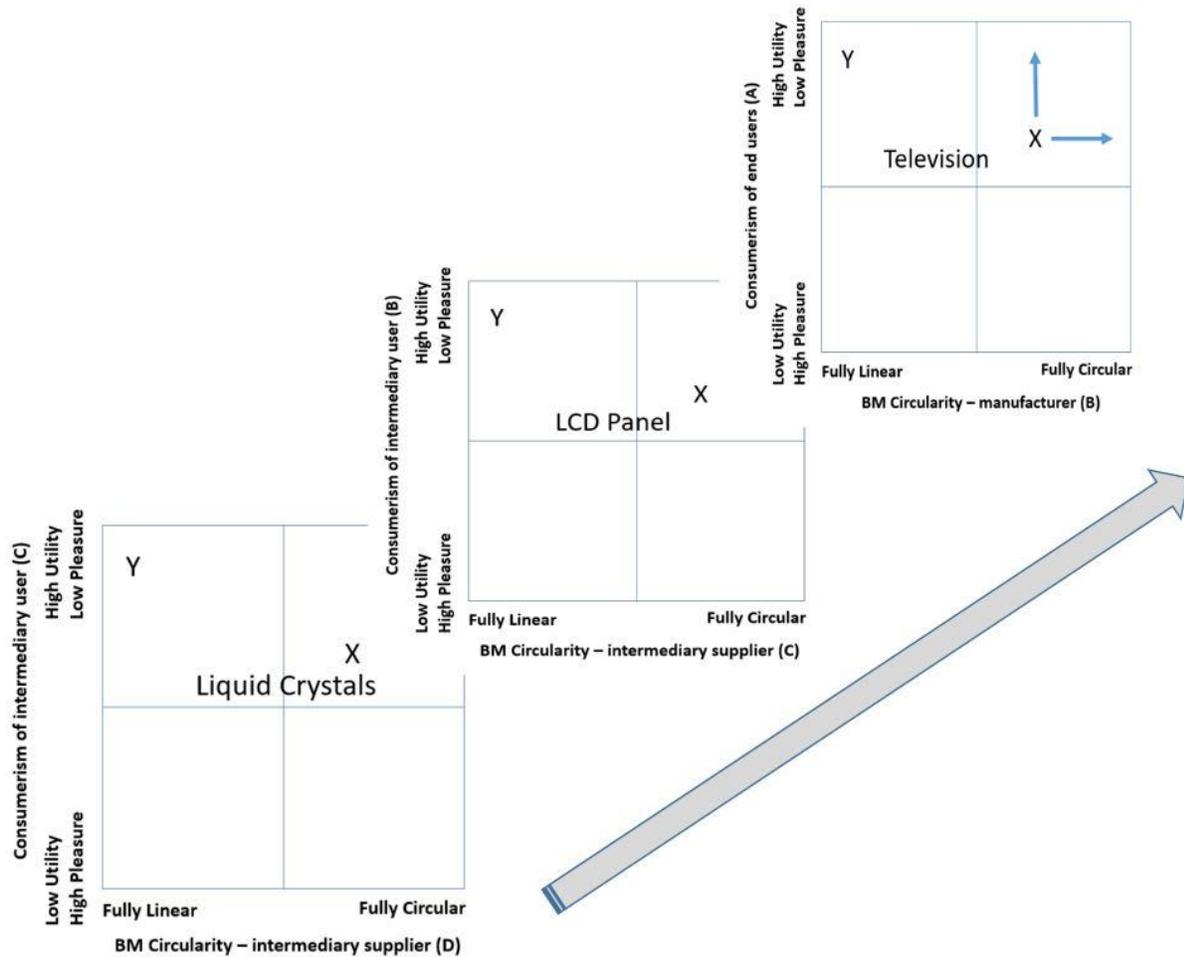
In the context of CBM, a similar entropy measure has potential for indexing CBMs and suggest the directionality of the business model for a product based on their levels of consumerism and BM circularity. The proposed entropy measure is therefore a function of (a) consumer's (ir)rationality and (un)awareness about the product's impact on economic, environmental, and social aspects, and (b) distribution of private and public cost for all stakeholders of the production process towards resource depletion, waste generation and pollution, for a given industries, technological overlaps, and geographies.

APPLICATION TO SUPPLY CHAINS: ROLE INTERCHANGEABILITY

In evaluating the CBM aspects of a supply chain, this framework requires stage-wise interpretation to explicate the role interchangeability between dimensions of consumerism and BM circularity of a given product, as per the boundary conditions. By role interchangeability, the framework allows evaluation of a single entity as both buyer and seller, or, simply, each player in a supply chain network for a given product. For instance, for Television (TV) as a product, its supply chain system would consist of TV manufacturers (first level) as suppliers of TV users, followed by LCD panel suppliers (second level), and Liquid crystal suppliers (third level). Figure 6 explains how this framework explains CBM acceptance behaviors for each of the supply chain partners in the making of TV. At the first level, the framework describes the entropy of TV (the product) using the end-customer's (A's) buying behavior and TV manufacturer's (B's) consideration of circularity in its BM. At the second level, the framework now describes entropy of a component of TV, i.e., LCD panel, using the TV manufacturer's (B's) buying behavior and the LCD Panel maker's (C's) consideration of circularity in its BM. This follows to the third level, where entropy of Liquid Crystal material is explained through the buying behavior of the LCD panel makers (B) and BM circularity of Liquid crystal suppliers (C) now.

From a sustainable development viewpoint, we see greater congruence of this framework with the famous ecologist Garrett Hardin's "tragedy of the commons" theory. The "tragedy of the commons" theory explains (a) the economic motivation of users/firms act independently in their own self-interest without concerning about the common good of all users/firms, that results into an act of collective action towards depletion of natural resources or environmental harm, and (b) the role government regulations such as include privatization, take-back laws, regulation, and internalizing the externalities (e.g., Hardin, 1968; Chopra & Meindl, 2013). For example, Chung et al. (2014) found that firms that are purely economically motivated tend to use resources with low recyclability and higher impact on environment due to the "tragedy of the commons" dilemma. Likewise, this framework provides the logic why certain firms, on one hand, choose to purchase from those suppliers whose supplies may have lower cost as well as lower environmental performance, and on other hand, choose to pursue BM to produce goods with shorter product life-cycle or more environmental waste. An entropy measure that considered the role-duality (i.e., role interchangeability) of firms (i.e., as both buyer and supplier) within its supply chain is expected to be more rational in its applicability.

Figure 6. Role interchangeability in a supply chain



RESEARCH IMPLICATIONS OF THE FRAMEWORK

In studies of CE and CBM, the construct of consumerism and its effect in developing CBM has been neglected so far. It does not appear even in respected industry reports such as Ellen MacArthur Foundation Reports on CE (EMF, 2013; EMF 2014). This framework brings a perspective for new thinking about CBM implementation in the context of adding circularity in BM, and calls for new research on the subject. In this section, we describe upon research approach for the study of implementing this framework, and additional research topics to extend this framework.

First, the key concepts of consumerism, CBM and their interaction forms the basis of this CBM acceptance framework. Consumerism has been proposed as an interplay between the choice of utility and pleasure seeking behavior in the mind of the consumers. Adding circularity in BMs has been proposed as a thinking against linear BMs to design business models that can stop or reduce resource depletion and waste/pollution throughout the production process. In management, marketing, and social sciences, consumerism has been extensively studied, whereas, CBM is an emerging concept. Therefore, it is important that the factors considered in searching their key determinants to operationalize these constructs must go beyond parsimony. The stream of CE implementation literature is still evolving and dominated by singular qualitative

case studies. To study this proposed framework, researchers are called to collect multilevel, multiorganizational, longitudinal, qualitative, and quantitative dataset within a single study. However, even if research is carried out in parts, it would characterize advancement toward a deeper understand about the question of “*why would consumers accept circular business models?*”.

This paper introduces the concept of “entropy” of business models as a measure of ‘evenness’ of ‘similarity’ about degrees of circularity in business models in the context of consumerism (Proops, 1987). However, researchers are called to study this concept and create this into an indexing method for evaluating consumers’ affinity for a product and the role of circularity in business models that it adopts in the production process in order to contribute to theory development in the domain of sustainable supply chain management.

CONCLUSION

The concept of CE is still emerging, and it requires a universal commitment from various societal actors (e.g., firms, policy-makers, academicians, environmentalists and so on) to bring in a major shift in the minds of consumers. It may be easier to bring in this change in the developed countries since these are considered as saturated markets. As against developing countries, consumers in developed countries tend to prefer short, long, pure, or cascade-cycle business models (i.e., renting/leasing/sharing/pay-per-use), since they understand the flipside of owning products (Terporten et al., 2012). Such a shift in consumers’ mind will push firms to reorganize their production process on the principles of CE and CBM, thus enhancing the efficiency of resources used to make high quality product that can be used for longer period (via reuse, recycle, remanufacture, and so on). The proposed framework attempts to create a basis to capture and analyze the interaction between consumer and organizational activities (CBM) in adopting CE in our products, markets, societies, and our living world. Additionally, this framework has the potential to conceptually represent conditions to promote principles of CE along supply chains. This framework also provides a directionality to the CE literature by associating the role of consumers and suppliers and their preparedness to accept circular business models.

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