International Journal of Innovation in the Digital Economy
Volume 12 • Issue 1 • January-March 2021

ICT Sector Perspective for Circular Economy in the Digital Era

Neeta Baporikar, Namibia University of Science and Technology, Namibia & University of Pune, India
https://orcid.org/0000-0003-0676-9913

Dileep Baragde, G.S. Moze College, India
https://orcid.org/0000-0001-9112-5535

ABSTRACT

Though the ICT sector strongly supports the circular economy, it is an economic and social system in which there is no waste, which is regenerative and restorative by design. Yet, the terminology and the policy emphasis on circularity are relatively new. Technology businesses are agile, fast-developing, and quick to exploit the market opportunities presented by disruptive digital technologies. A movement away from product-based business models to service delivery over the last decade is a typical example of this trend. In such areas, a business opportunity is closely aligned with the move to greater sustainability, and it would be surprising, in such a dynamic industry, if these new models are welcomed and adopted. Hence, adopting a systematic literature review method, the aim of this paper is to provide an ICT sector perspective for the circular economy in this digital era.

KEYWORDS

AI, Analytics, Automation, Big Data, Blockchain, High-Performance Computing, Internet of Things, Technology

INTRODUCTION

A circular economy is an industrial system that is restorative or regenerative by intention and design, it replaces the "end of life" concept with restoration, shifts towards the use of renewable energy, eliminates the use of toxic chemicals, which impair re-use, and aims for the elimination of waste through the superior design of materials, products, systems and within this, business models (EMAR, 2015). Such an economy is based on a few simple principles. First, at its core, a circular economy aims to design out waste. Waste does not exist – products are designed and optimized for a cycle of disassembly and re-use. These tight components and product cycles define the circular economy and set it apart from disposal and even recycling where large amounts of embedded energy and labor are lost. Secondly, circularity introduces a strict differentiation between consumable and durable components of products. Unlike today, consumables in the circular economy are largely made of biological ingredients or "nutrients" that are at least non-toxic and possibly even beneficial and can be safely returned to the biosphere directly or in a cascade of consecutive uses (WEF, 2014). Durables such as engines or computers, on the other hand, are made of technical nutrients unsuitable for the biosphere, like metals and most plastics. These are designed from the start for re-use. Thirdly the energy required to fuel this cycle should be renewable by nature, again to decrease resource dependence and increase system resilience.

DOI: 10.4018/IJIDE.2021010104

The circular economy construct has taken shape and is now a very large entity, with its thought leaders, language and delivery bodies, supported by a growing body of literature and academic research. It needs to remain focused on achieving economic and environmental outcomes through practical implementation as opposed to the pursuit of a perfect, and probably unachievable, economic model. It is very much looking forward to assisting policymakers by providing the technical and market information that will help to inform their future decision making on this important topic. Despite the presence of these drivers, a strong policy focus and clear thought leadership, the opportunities for implementing circular economy thinking are underexploited. In response to resource constraints, CSR concerns, and recycling obligations, the sector continues to improve the efficiency of that route (TechUk, 2015).

Objectives

For this paper, the ICT sector comprises the Information and Communications Technologies (ICT) and Consumer Electronics (CE) sectors. Businesses that make up this sector include IT hardware manufacturers, software developers, IT services companies, data center operators, telecommunications providers, consumer electronics manufacturers, system integrators and a huge range of associated service providers and consultancies.

The paper does not intend to define or redefine the circular economy or develops new thought leadership on circular economy frameworks or implementation but aims to explore the specific implications of the circular economy for the ICT sector; an assessment that thinks is somewhat overdue. It acknowledges the degree to which our businesses have already adopted circular economy models; articulates some of the barriers that are preventing wider deployment of circular thinking in the ICT sector, and tries to find ways to address them. It is important to be aware of circular approach limitations and also where it could if badly managed or too ideologically applied, compromise innovation within this rapidly changing sector.

Further, it reviews some successful examples of circular thinking by technology companies. A circular economy is desirable from an environmental point of view. However, implementing circular thinking presents some unexpected problems and challenges for the sector and hence we identify the market, technical, policy and cultural barriers that need to overcome: unless acknowledge them, unlikely to be in a position to address them effectively.

LITERATURE REVIEW

Several circularity strategies exist to reduce the consumption of natural resources and materials and minimize the production of waste. They can be ordered for priority according to their levels of circularity (Figure 1). Smarter product manufacturing and use, for example by product sharing, are generally preferred overextending the lifetime of products, because this product is used for the same product function or more users being served by one product (a strategy with high circularity). Lifetime extension is the next option and is followed by the recycling of materials through recovery. Incineration from which energy is recovered has the lowest priority in a circular economy because it means the materials are no longer available to be applied in other products (low-circularity strategy). As a rule of thumb, more circularity equals more environmental benefits.

Table 1 summarizes the investigative questions for monitoring the progress of CE transitions in the value chain of any products or services.

The worldwide innovation spending on equipment and Information Communication Technology (ICT) related administrations is evaluated to be about the US $ 1.7 trillion and developing at a CAGR of around 7% over the most recent two years. Far beyond this, the building and Research and Developments spend represents about US $ 800 billion. The spend in Information Communication Technology (ICT) or Business Process Outsourcing (BPO) was relied upon to touch over US 500 billion and the US $ 450 billion every 2008 separately, with ICT Services recording development of