Conclusion. The future of digitisation for the circular plastic economy in Africa.

KOLADE, Seun <http://orcid.org/0000-0002-1125-1900> and OYINLOLA, Muyiwa <http://orcid.org/0000-0002-5760-672X>

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CONCLUSION

The future of digitisation for the circular plastic economy in Africa

Oluwaseun Kolade and Muyiwa Oyinlola

1 When the digital meets the circular

Globally, the conversation about the circular economy has gathered momentum in recent years. Increasing frequencies of destructive climate disasters such as the East African drought, Australian wildfires, cyclones and South Asian floods have focused minds about the urgent imperative of the sustainability agenda. At the heart of the global conversation is the need to fundamentally rethink the way humans use limited natural resources for production and the need to embrace new habits of consumption that cut waste and optimise value. Circularity became the most effective catchword for this campaign. Within the past decades, thousands of scholarly articles and policy papers on the circular economy have been produced, and the circularity conversation has gained traction in academic and practitioner conferences, as well as public fora and social media.

Within the wider conversation about the circular economy, plastic pollution has taken a central stage. This is because plastic products constitute a peculiarly problematic challenge, among other manufactured products. Plastics are non-biodegradable, generally cheaper to produce, and are typically made of composites including coolants and adhesives that make them difficult to recycle. Once disposed indiscriminately, they find their way into the world's oceans where they are a great menace to aquatic life and to the wider ecosystem. The circular plastic economy is therefore an effort to challenge and reshape the linear trajectory of plastic production and consumption to a model that transforms the entire plastic value chain from design phase to production-and-use phase all the way to the end-of-life phase (Johansen et al., 2022). This transformational process is underpinned by the philosophy of resource efficiency and value optimisation realised through innovation and creativity.

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This is where the circular meets the digital. As discussions about the circular economy gathers pace, talks about digital transformation has reached feverish pitch – not least in the wake of the Covid-19 pandemic. With heightened interests come greater scrutiny of the hitherto prevailing orthodoxy of digital innovations. Thus, in recent years, more stakeholders are questioning whether digital technologies should be about maximising production or whether digital innovations should, in fact, prioritise the pressing human challenges around pollution control and sustainable use of limited natural resources. Industry 4.0 is therefore being transcended by Industry 5.0, the latter built on three key pillars of humancentricity, resilience and sustainability (Xu et al., 2021). Humancentricity emphasises the need to prioritise human needs in the use of technology. In other words, increasing production should not be an end in itself. Rather, the impact of digital innovations should be measured in terms of the functional outcomes of the innovations in relation to human needs (Kolade and Owoseni, 2022). The second pillar of Industry 5.0, resilience, refers to applications of digital innovations to overcome disruptions and turbulence in relation to economic and social systems (Sindhwani et al., 2022). The sustainability strand focuses attention on resource efficiency. In other words, it highlights the need to apply Industry 4.0 innovations in new and creative ways to optimise limited natural resources both in relation to production systems and consumption habits (Breque et al., 2021). Thus, Industry 5.0 is not conceived as a linear progression of Industry 4.0 with, for example, the emergence of new technologies previously unknown in the Industry 4.0 phase. Rather, it is a paradigm shift that invites stakeholders to find creative ways of applying existing and emerging technologies to tackle pressing global challenges and human needs.

The circular plastic economy is a prime example of an area where Industry 5.0 principles can make a big impact. It fits within the wider conversation about the sharing economy and collaborative consumption. Digital technologies are being used to link stakeholders, mobilise new actors, and empower existing actors to actively engage in a win–win process to drive a transition to a circular plastic economy. Nowhere is this more important than the African continent, where the industrial process is still in the early stages, and the economy is not locked into old technologies and sunk investment associated with linear economy paradigm. Instead, African countries are presented with an auspicious opportunity to leapfrog and lead the world in greener technologies that do not, in the same breadth, compromise growth ambitions.

In many ways, the huge opportunities for the African continent to play a leading role in the circular economy agenda is a key premise of this book. Across its 16 chapters, scholars, policymakers and practitioners have woven together a compelling narrative that illuminates the challenges as well as opportunities for a circular plastic economy on the continent. Digital innovations are at the heart of this, the linchpin of an ambitious agenda to create and invigorate new ecosystems powered by forward-looking policies, platform innovations and new production

systems. The chapters also highlight the nuances and peculiarities of country-specific contexts. The followings are the key takeaways from the book.

2 Key takeaways

Digital innovations are essential for inter-sectoral linkages and stakeholder collaborations

The chapters in this book highlight a number of exciting innovations and high-impact initiatives driven mostly by startups and third sector organisations across the continent. However, it is clear that many actors continue to work in silos, the consequences of which is that the full potentials of these initiatives are not fully realised (Kolade et al., 2022; Oyinlola et al., 2022). At the same time, in the public sector, national governments are showing increasing commitment to tackle the challenge of plastic pollution through ambitious regulations and policies. However, many of these policy interventions have followed a top-down approach, with minimal engagement with the private sectors and frontline non-governmental organisations NGOs.

This book highlights the potentials of digital innovations to facilitate a new area of inter-sectoral engagement and collaborative synergy. For example, as discussed in several chapters, platform innovations are being deployed by digital innovators to link up waste collectors with recyclers in a process that creates new income opportunities for poorer households and otherwise invisible informal operators, while reducing logistics and transaction costs for recyclers. However, when big corporations connect with these multisided digital platforms, the impact of the ecosystem is multiplied via investment in recycling centres and operators and via a digitally enabled deposit refund system. The impact is even greater with the involvement and support of the public sector, through strategic procurement policies by which governments drive demand for recycled products, tax incentives for innovators, and direct investment in digital platforms.

Among others, this book highlights the immense and under-utilised potentials of blockchain technologies. Blockchain solutions are being trialled in a number of African countries, including South Africa. In the example of BanQu in South Africa, blockchains technology has been used to mobilise waste reclaimers and recyclers in a campaign sponsored by Coca Cola, a major corporate manufacturer of plastic packaging. While the effort has achieved considerable success, there is little evidence of government involvement in the project. This exemplifies a critical missing gap across the continent, where a lot of promising initiatives have been launched independent of national governments, to considerable local successes but ultimately limited outcomes in scaling. In order to scale and sustain innovative campaigns on national and continental levels, governments should be connected and actively engaged on these platforms.

Another key area discussed in this book is data sharing. This is one of the biggest impediments to circular economy transition on the continent. Digital innovators often work in the dark in the development of digital products for the circular economy. Similarly, a lot of policy making on the continent are hampered by limited and inadequate data, for example, about consumption behaviour and disposal practices of households and organisations. A plastic data exchange, proposed in this book, can be pathbreaking for stakeholder contributions and impact for the circular plastic economy. It will enable digital innovators to create and continually improve higher-value products for other stakeholders engaged in the ecosystem. It will also help policy makers to launch targeted and more efficient interventions aimed at specific sub-sectors and players in the circular plastic ecosystem.

Curiously, there are intimations of technological scepticism from some national governments which are probably reluctant to play catch up or follow the lead of processes and campaigns initiated by startups. Attitudes are gradually changing, however, with some governments, including Nigeria, Kenya and Rwanda recently setting up ministries and agencies for "digital economy". In many cases, government agencies are now convening, as well as participating, in initiatives relating to a digitally enabled circular economy.

The potentials and networking effects of digital innovations are not limited to platform innovations and blockchain solutions. There are also opportunities for digital applications in plastic production and re-manufacturing processes. One good example discussed in this book is 3D printing, a disruptive, additive manufacturing process that upends the traditional logistics and inventory requirements of traditional manufacturing. Three-dimensional printing offers the opportunities for plastic wastes to be repurposed as pellets in re-manufacturing of plastic and composite products. It also enables the economy of one in place of the economy of scale, thereby bringing smaller operators and microenterprises into play. Moreover, its digital foundation offers opportunities for various stakeholders to contribute, including waste collectors, programmers and operators of 3D printers, as well as governments. The latter point brings us to the next key point raised in this book: the critical role of government in a digitally enabled circular plastic ecosystem.

Digital innovations must be matched with policy innovations and political will

While digital innovations offer a wide range of exciting prospects for the circular plastic economy, the book also highlights the urgent imperative of policy innovations and political commitment to the circularity agenda. The emerging evidence from countries like Rwanda is that when policies and regulations are in sync with digital innovations, much greater success is achieved for the circular plastic economy. This point aligns with the broader theme of inter-sectoral

linkages and stakeholder synergy that cut across the chapters in the book: that ideas work better when linked with other ideas, and stakeholders can achieve much greater impact collectively than the sum of their individual contributions.

Thus, the first requirement on this front is that African countries need new ideas to accelerate the transition to a circular plastic economy. In order to generate new ideas, government and public sector countries must look outwards for examples of best practices across the world, where circular economy policy ideas have been successful. As the old saying goes, African countries do not have to re-invent the wheel of circular plastic policies. Yet, African countries must do more than imitate and adopt policy ideas from oversees, not least because the institutional, political and cultural contexts are different even among individual African countries, not to mention the differences in relation to non-African contexts. Therefore, circular policy innovations in Africa should be achieved, not by wholesale importation of new ideas, but by aggregation, integration and customisation of new ideas to meet specific needs and outcomes in individual countries.

This is where policymakers must look as much within as they look outside their countries. Since policies are made for people, rather than people for policies, national governments should leverage on the existing ecosystem and networks of non-state actors in the circular plastic economy. These include digital innovators and frontline non-governmental organisations whose knowledge and experience can give national governments access to critical data and information about the local contexts in which policies are being enacted and implemented. These frontline organisations and enterprises can also act as the critical bridge between governments and households and communities in the grassroots, in terms of policy formulation, communication and implementation. More often than not, policies fail because they are disconnected from the realities of everyday life and because of low levels of citizens engagement. In order to mitigate this, policymakers should work with frontline civic organisations and digital enterprises to engage citizens from the early stages of policy ideation and formulation, all the way to implementation. Community co-ownership of policies and regulations is essential to the success of circular plastic economy in African countries.

The point on community ownership of public policies should be complemented with an equally important point about political will. While the challenges of sunk investment and vested interests are relatively light in relation to the linear economy on African continent, the influence of multinational corporations and major manufacturers is disproportionately big in many African countries. In some cases, big corporations have forged alliance with certain sections of the political elite to achieve state capture, rooted in an unwritten commitment to existing linear paradigm of production and pollution patterns. In order to upend this trajectory, Africa needs strong political leadership and commitment to circular plastic economy ideas. This is required, for example, to make the use of virgin products less desirable for the manufacture of plastic products. As this book highlights, Rwanda exemplifies this type of strong leadership and commitment to

the circularity agenda. There, the national leadership has shown its ability to take a stand, sometimes against big corporate interests, to drive circular, environment-friendly policies. Conversely, Rwanda also seems to expose a weakness in having a strong political leadership that is not adequately complemented with civic and community engagement. Cultures and attitudes are changing more slowly than policies and regulations. You need a good blend of strong leadership and public ownership to achieve long-term impact, institutional transformation and cultural change beyond the tenures of specific governments in power. You need this combination to achieve a market-driven circular plastic economy which can run and grow on its own with only light-touch interventions from national governments. We now turn attention to this third and final point.

Digital innovation is the engine of a market-driven circular economy in Africa

If the circular plastic economy is to gain enough traction to upend the trajectory of linear production and consumption, it needs to be market-driven. Activist government interventions and regulations are required, especially at the initial phases, to create demands and invigorate the market. As the market grows and more stakeholders become involved, government involvement need to focus less on regulations and penalties and more on incentives and market-oriented mechanisms such as strategic public procurement. One of the main challenges with incentives and market-driven interventions is that they often miss their targets in an environment where institutions are relatively weak and partisan politics dominate the implementation of public policies. In such politically charged environments, financial and in-kind incentives from governments are sometimes used to reward political party loyalists or channelled via party activists to consolidate political power. In these environments, typical of many African countries, digital innovations can be harnessed for transformative market impacts in three key areas.

Firstly, digital innovations can be used to ensure transparency and greater effectiveness of market-oriented public policies. In a digitally mediated, publicly accessible market-oriented intervention, stakeholders can be easily enabled to track and monitor front-end implementations of public policies. The public will be able to see, for example, which incentives are going to which organisations and actors in the circular plastic ecosystem. This can significantly cut corruption and waste. For service-oriented and outcome-driven governments, the digital transformation of public policies can be harnessed as a positive sum game in which governments in power realise political capital from a transparent, traceable implementation of market-based interventions. Publicly visible impacts of policies can be used to win hearts and minds.

Secondly, digital innovations provide circular economy actors with platforms and opportunities to better organise themselves, not only to access benefits from

existing market interventions but also to influence future policies to scale and grow the market for the circular plastic economy. In many African countries, this organisation is at very early stages, with big gaps and opportunities for impact and growth. Even more, there are huge market opportunities at cross-country and continent-wide levels which can be realised with digitally enabled organisation of market actors. This book highlights reflections from stakeholders in focus groups and in-depth interviews about these opportunity gaps and the potentials they offer for the future of circular plastic economy on the continent.

Finally, digital innovations are essential for increased and easier access of the general public to circular plastic products. There is a huge market for circular products on the African market. Some of this is partly related to the paradox of income inequality on the continent. Currently, a considerable proportion of multiple-use plastic products disposed by mid- and high-income households are usable and in high demand in low-income communities. Digital innovations can directly link those disposing items with those who need them as is or connect them with recyclers. Similarly, digital platforms can be used to connect buyers with sellers of remanufactured plastic products. The deployment of digital innovations helps, among others, to simplify the logistics of access and the transaction costs normally associated with market processes.

3 Final thoughts

This book has highlighted a range of ecosystem, institutional and market opportunities associated with a digitally enabled circular plastic economy in Africa. It did not shy away from the challenges, either. The circular plastic economy is promising and realisable only if stakeholders work together, if national governments summon the will and wits and market processes are enabled to drive the circular transition. Digital platforms are particularly effective in linking stakeholders together for synergistic collaboration, both in virtual and face-to-face settings. In the public sector, digital products work much better with government buy ins and can enable access to otherwise difficult to access data needed for effective public policy. Finally, digital innovations are essential for the circular plastic economy agenda to work as a viable, profitable business. Digital innovations, including multisided digital platforms, can drive circular business models. They can also be used to scale successful market-oriented interventions through the inclusion and empowerment of new actors in the circular plastic ecosystem.

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