**ASSESSING THE RELEVANCE OF TRADITIONAL COST THEORY IN THE IMPLEMENTATION OF CIRCULAR ECONOMY ACCOUNTING PRACTICES: A CASE STUDY OF BENIN ELECTRICITY DISTRIBUTION COMPANY PLC, NIGERIA**

**Abstract**

This study evaluates the applicability of traditional cost theory in circular economy accounting practices. The design and method adopted involve a case study of three states (Edo, Ondo and Ekiti), Benin Electricity Distribution Company (BEDC) electricity companies, putting **cost** theory into consideration, who created a value network for creating and implementing an innovative packaging solution by circular economy concepts. Content analysis was employed to explore the accounting tools employed. The findings indicate that innovation and circular solutions are found in new structural configurations in terms of value networks. In addition, managers' decision process completely avoided passing through the accounting function; they used informal accounting and life cycle analysis, which ensured a multi-stakeholder dialogue from the life cycle approach. The theoretical and practical implications of the study are concerned with management accounting systems' effectiveness in supporting organisations pursuing circular solutions, on which cost theory is based. The study concluded that in accounting for the circular economy, traditional cost theory does not apply well, especially in fast-changing technology-driven industries such as electricity distribution, as the traditional mechanisms of costs are unable to account for the complexities of circular value generation and lifecycle sustainability. Also, finding that managers of BEDC electricity companies use informal accounting and life cycle analysis over standard accounting practices. The study also illustrates a move towards a decentralized decision-making process in the management of circular economy projects. The study recommended that organizations such as utility companies, in particular of BEDC, should reorient their management accounting systems to include circular economy metrics such as life cycle costing, resource efficiency as a metric, and environmental impact assessments. On top of that, the accounting function needs to be brought back into the center of management decisions as a tool for ensuring cost considerations are in line with sustainability objectives and stakeholder demands and managers and accounting professionals need ongoing training in circular economy principles, sustainability accounting, and using innovative tools like life cycle analysis and environmental management accounting.

**Keywords:** Management accounting, digital accounting, accounting for circularity, sustainable and circular business models

**INTRODUCTION**

The world’s shift towards sustainable economies has revealed the shortcomings of conventional cost theory under the accounting practices of the circular economy. The theory of costs from traditional linear production, based on cost efficiency and profit maximization, does not reflect the value of efficient use of resources, minimization of waste, and sustainability of the environment over the long term (Zhang et al., 2025). The increase in the uptake of the circular economy concept by businesses and governments around the world has highlighted the inadequacies of traditional cost structures and accounting practices to accommodate closed-loop production, longevity of products, and re-use of materials (Montag, 2023; Abou Taleb & Al Farooque, 2021). This misalignment is particularly clear in Nigeria in the context of cost theory’s insufficiencies relating to national accounting and the circular economy. Even as the evidence mounts of environmental destruction, scarcity of natural resources, and inefficiency of industrial practices, most Nigerian industries and public sectors have stuck to old cost models that simply omit the economic viability of sustainable resource management (Oluwatayo & Ojo, 2024). This misalignment, according to Adesua-Lincoln, A., (2025), prevents the exercise of the necessary policy implementation, green investments, and for the country to be able to fully key into the global circular economy practices, thus, adversely affecting the environment and long-term economic viability as well.

In other words, even globally with an increasing fundamental belief in sustainable development, traditional cost theory is based on linear economic principles that are disconnected from the priorities of the circular economy, which focuses on regenerative and resource efficiency (Nygaard, 2022)c. It is shown in the literature that the true value of waste minimization, resource recycling and ultimately environmental effects are not well presented through traditional accounting methods (Okafor et al., 2025). There is to misalignment in this lack of relationship, providing no accurate indication of economic performance in circular frameworks. More specifically, Nigerian firms like the Benin Electricity Distribution Company (BEDC) do not have robust cost accounting processes embedded into their operations, which would allow for the effective integration of circular economy practices. It has been suggested that the relevance and flexibility of traditional cost models in this context have little empirical testing. These cost theories have therefore been unclear when it comes to their effectiveness in supporting sustainable financial choices in circular systems (Montag, 2023; Asante-Darko et al., 2024). But while these studies point out the need for an accounting paradigm shift, none of them provide any clues on how such a change can come about. There is a need to develop new accounting practices and information that provide relevant information and guidance to managers of BEDC electricity firms engaged in circular economy initiatives to enable sustainable patterns of production and consumption. The purpose of this study is, therefore to assess whether cost theory in its traditional understanding is relevant to the analysis of circular economy accounting at BEDC.

**CONCEPTUALISATION**

**Management Accounting**

Management accounting refers to the preparation of “management reports and accounts which are designed to assist management in making decisions, planning and controlling the operation of the organization” (Jonathan & Onyoni, 2025). Management accounting provides financial information useful for making medium and short-term decisions and shaping strategies that are relevant for the internal operations of the business (Șavga et al., 2024). As opposed to financial accounting, which is intended for outsiders and must comply with external reporting standards, “management accounting” is for internal purposes and includes budgeting, forecasting, and performance evaluation designed to help management establish and meet business goals. Management accounting has, as a result of the ever-changing business context, moved from a cost-cutting and profit-increasing viewpoint into one that incorporates non-financial variables and measures of sustainability within the business strategy and even now incorporates factors beyond the business itself (Olaoye et al., 2024).

**Digital Accounting**

Digital accounting is the application of digital technology, such as software, cloud computing, and automation technology, to accounting processes including bookkeeping, financial reporting, and auditing (Azegbeobo et al., 2025). Digital accounting is a technological revolution in accounting as it enables more accurate and efficient accounting processes and provides for real time financial information (Majekodunmi & Idowu, 2025). Digital transformation is leading to the automation of accounting processes. This is transforming the capturing, processing, and analysis of financial data through the use of technologies like AI, blockchain, and data analytic tools. Computerized accounting minimizes human error, improves adherence to regulations via programmed screens, and enables more effective decision-making processes by providing the option of immediate rather than historical reports; these advantages are especially significant given the rise of remote working and the needs for nimbleness and transparency in scaling businesses (Olumoh, 2025).

**Accounting for Circularity**

Circularity accounting is the practice of measuring and accounting for business activities that consider reuse, recycling, and efficient use of materials according to a circular economy paradigm, in both financial and non-financial terms (Oluwatayo & Ojo, 2024). Circularity Accounting connects the environment to financial reporting by representing the economic worth and effects of circular business activities. Okafor et al. (2025) argued that conventional accounting is not capturing the advantages of circular economy solutions such as reuse of resources, product lifecycle extension, and closed-loop supply chains. To circularity, accounting for this accounting introduces measures and models for valuing resource inputs and waste outputs and costs over the lifecycle (Jonathan & Onyoni, 2025). It thus aids in sustainability reporting and helps stakeholders to clarify the aspects of circularity that are creating long-term value. While this prescription is framed as an important advancement in accounting, the authors view allowing for accounting for circularity as crucial when businesses are increasingly pressured to be sustainable and transparent.

**Sustainable Circular Economy**

According to Jonathan & Onyoni, (2025), a circular economy is an ‘economic system of “cradle to cradle” and reuse, repair and refurbishment, remanufacturing, and recycling as well as assuring environmental, social and economic sustainability’. The innovative concept of the sustainable circular economy provides the means for a future model of growth that does not depend on the destruction of the earth but rather connects economic development with long-term flourishing and being responsible stewards of resources (Majekodunmi & Idowu, 2025). Whereas the linear economy of take-make-dispose is not concerned with minimizing ecological footprints while generating economic wealth, the sustainable circular economy is focused on maintaining products and materials within the economy to lower ecological impacts while generating economic wealth. Importantly, Olumoh (2025) conceptualizes sustainability as the incorporation of social responsibility and ecological harmony in production and consumption. Circularity has begun to be embraced by governments, businesses, and society as a response to the need for innovation and systemic transformation and multi-sectoral collaboration in order to respond to and scale solutions to these global problems as climate change, resource shortages, and pollution (Olaoye et al, 2025).

**Circular Business Models**

According to Akanji et al. (2023) opined circular business models “are business strategies for creating, delivering, and capturing value that have built into them, by design, a regenerative capacity that enables resource efficiency, waste minimization, and closed loop systems. Circular business models thus transform how value is created, with profit now constituting environmental good by making the most out of existing resources and maximizing the lifecycle of products (Eze et al., 2025). Circular business models, such as product-as-a-service, leasing, sharing platforms, and reverse logistics models, focus on product utility rather than product ownership, and incentivizes companies to design for durability, repairability and recyclability (Ilesanmi, 2025). Going circular can save costs by reducing material inputs, stimulate innovation, result in greater customer loyalty, and help comply with environmental regulations. There are, but, barriers that need to be overcome, including issues of regulation, consumer behavior and paying upfront costs. But to benefit from these models companies must also incorporate circularity in their value chain and performance metrics.

**METHOD**

The work was mainly underpinned by a systematic review of the literature and supplemented with findings from a single case study design examining BEDC operations within the three major states Edo, Ondo and Ekiti in Nigeria, utilizing a mixed qualitative methodology. This two-pronged approach secures theory while at the same time being specific to context. The literature review was performed by searching the Scopus, Web of Science and Google Scholar databases using the keywords “circular economy”, “business model innovation”, “energy sector”, “power utilities”, “prepaid metering” and “management accounting” to identify 54 peer-reviewed journal articles. All articles were selected because they were pertinent, recent (2010-2024), and specifically applicable to circular business models in the energy sector. The authors of this article derive 45 parameters, relevant to circular business models (CBMs) specifically in power utilities, from these studies by employing open coding techniques as performed in grounded theory. The parameters fell into six main themes: Efficient use of resources, Engagement with customers, Cost structure, Technology, Revenue innovation, and Regulations. A form of triangulation, comparing the literature findings with the data obtained from the case study, was used to increase the validity of the data. Those that demonstrated a convergence around similar CBM principles or had a distinctive contextual contribution were kept. The study utilized a single case study design to investigate the role of management accounting in the execution of prepaid metering system from the BEDC value network. A case study design was selected to address the theory-practice gap and to produce an in-depth account of a phenomenon situated within a real-life context as suggested by Oluwatayo and Ojo (2024).

**Theoretical Review**

**Cost Theory**

Cost theory describes how costs of production relate to levels of output, helping firms to minimize costs in order to maximize profits. Formulated mainly in the 19th and 20th centuries, thanks to the contributions of classical economists such as Adam and Marshall, Cost Theory forms the foundation of microeconomic production analysis and separates fixed, variable, total, average, and marginal costs. Ibrahim and Gangodawilage (2024) theorized that within the short time frame, at least one factor is fixed, while in the long time frame all factors are variable that affect cost structures and economies of scale. The theory sustains managerial decisions like pricing and utilization of resources, and serves as the foundation of modern cost accounting and operating planning (Roffia et al., 2024). Cost theory assumes that firms aim to minimize cost and maximize profit, the production function is fixed and given, inputs are infinitely divisible and the prices are fixed, and diminishing marginal returns in the short run do exist (Olumoh, 2025). Cost Theory is criticized for assuming perfect information and rationality, which in turn may not dominate real-world business environments because cost theory disregards behavioral, technological, and regulatory complexities affecting cost behavior (Majekodunmi & Idowu, 2025). In addition, emerging digital and knowledge-based economies destabilize traditional cost classifications according to intangible inputs and elastic forms of pricing. Cost Theory continues to be especially relevant in accounting as it forms the foundation for the understanding, analysis, and control of the costs of doing business (Șavga et al., 2024; Oluwatayo & Ojo, 2024; Montag, 2023). Cost Theory helps accountants classify, report, and analyze cost data to guide strategic planning, budgeting, pricing, and financial decision-making.

**Empirical Review**

Adesua-Lincoln (2025) explores the SMEs' experiences and challenges in attempting to keep up with the application of circular and sustainable methods. Through Lagos Nigeria business owners' questionnaire surveys, the research helps fill the paucity of circular economy practice literature of SMEs' practices and provides policy implications to policymakers for the implementation of effective policy initiative towards a responsive SME practice. His work suggests different strategies and policy measures to facilitate SMEs to acquire the skills and knowledge to empower them to embrace environmental sustainability and circularity strategies with confidence.

Olaoye et al. (2025) analyzed the impact of electronic accounting and corporate governance on the financial sustainability of Nigerian companies. The research used secondary data from the financial reports of 50 listed firms across different industries between the years 2014 and 2023 and follows a quantitative approach comprising descriptive statistics, correlation analysis, and panel regression models. The study revealed that digitalization of accounting, especially cloud accounting, greatly fosters financial transparency and sustainability. Good corporate governance, especially executive remuneration plans tied to sustainability objectives, underpins accountability and long-term financial sustainability.

Jonathan and Onyoni (2025) suggested a circular economy model for Nigeria and Kenya construction wood Waste, in which this paper first of all explored the circular economy opportunities and challenges of Nigeria and Kenya's construction industry, and then reviewed comparative literatures of organizational or business models in circular economy for construction industry and other industries, in order to learn and re-interpret an befitting circularity models applicable in Kenya and Nigeria's construction wood waste. Secondly, there was a questionnaire survey of the stakeholders in both nations to have access to their perception of how feasible the model developed is. The stakeholder survey indicates that 69 percent agreed that the model is feasible in Kenya, 38.5 percent agreed that the model is feasible in Nigeria, and another 38.5 percent agreed that the model is quite feasible in Nigeria.

Zhang et al. (2025) investigated the composition of the circular business model for construction companies because they play a central role in the implementation of circular economy principles to see sustainable use of raw materials and minimize the sector's environmental impact. The article adopts a literature review method of 53 journal articles, where analysis content covers 34 dimensions of circular business models for construction companies. The study also determines the fields of possible future research regarding where the various components of the business model overlap. The findings in this study give positive feedback to the policymakers and decision-makers on how to maximize external support and circular value network development in order to enhance circular business model adoption from a construction company's perspective.

Montag (2023) aimed to reduce the environmental impact of their operations and facilitate the creation of a more sustainable future. Used comparative policy analysis to contrast Germany's and Japan's historical, present, and future outlooks of circular transformation, particularly each country's outlook of circular business models. His work illustrates that the integration of the current existing circular business model archetypes and the developed circular business model matrix helps to fill the gaps in the literature since it tells us about circular purposes, strategies, actors, and social and political consequences of each typology of circular business models.

The emergence of informal accounting. Meanwhile, researchers found that informal accounting gathered and ordered by managers was the primary source of contribution to decision-making. As follows Heikkilä (2023) and Kilfoyle et al. (2013), informal accounting of this type emerges as an employees'-and-managers self-created setup of qualitative and quantitative elements, normally translated by employees and managers into their requirements for creating bottom-up information. The peripheral role of accountants in conventional accounting practices. Management literature on Business Model Innovation (BMI) considers income and cost stream analyses to be crucial to developing innovative solutions (Olaoye et al., 2025; Olumoh, 2025). For us, several partners had referred to the choice to apply bio-based compostable plastics as a "leap into the unknown" due to the "impossibility of anticipating clients and revenues in the business plan. The technological solution to the specific challenge was delivered by BEDC, following intervention from the government after several discussions and negotiations with a broad set of stakeholders.

**CONCLUSION AND RECOMMENDATIONS**

Based on the synthesis of recent literature, the study concluded that training programs and capacity-building should be given top priority by the organization so that accountants and financial managers can learn skills that will enable them to apply circular accounting principles effectively and with assurance. This study proposes a more integrated and context-sensitive approach to researching the application of classical cost theory in circular economy accounting practice, particularly in utility firms like Benin Electricity Distribution Company PLC. The variations between studies done by Jonathan and Onyoni (2025); Adesua-Lincoln (2025), who called for customized policy intervention and capacity-building towards enabling construction SMEs' uptake of circular approaches, and Zhang et al. (2025), and Heikkilä (2023); Kilfoyle et al. (2013), whose focus was on structural and strategic models for circular value chains for the power sector, highlight the necessity of sector-specific tailoring in putting circular economy ideas into practice. Sequel the empirical findings of the study, the study recommended that:

1. Current cost accounting systems are modified to incorporate circular economy performance indicators such as regeneration of resources, reduction of waste, and lifecycle costing that are not part of conventional cost models.
2. Policymakers and industry leaders need to develop sectoral guidelines that interpret circular accounting practices into the particular operational and financial dynamics of the electricity distribution industry.
3. Benin Electricity Distribution Company PLC must involve universities, industry stakeholders, as well as regulators in developing a localized circular economy accounting model that will encompass both the traditional cost theory considerations and environmental sustainability goals. Further empirical studies need to be conducted to balance sectoral variations in the uptake of a circular economy by investigating cross-industry practices and developing best-fit practices in public utility companies.

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COMPETING INTERESTS

Authors have declared that they have no known competing financial interests OR non-financial interests OR personal relationships that could have appeared to influence the work reported in this paper.

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