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Assessment of Consumer Awareness of Circular Economy Principles and Practices in Federal Capital Territory, Nigeria

Abstract

As the world tends towards embracing the concept of circular economy (CE), the level of awareness and perception towards the ideal remains an important factor in its adoption. Considering the CE principles towards its adoption, the study considers the extent of consumer awareness of CE principles and practices in the Federal Capital Territory (FCT), Nigeria. The respondents (400) of the study entail the respondents randomly selected from eight districts across the AMAC (Phase I and II). The data gathering was done with the aid of a questionnaire while data analysis made use of descriptive statistics such as frequency count, percentage and mean value. Most respondents were not aware or heard of the term circular economy before (46.4%) while those that had heard about the term suggested to have heard about the circular economy through social media (50.0%) and news articles/blogs (25.0%). Most respondents do not fully understand CE practices (21.9%), although they are familiar with terms such as reusing products (34.9%), repairing damaged products (21.4%) and recycling (22.1%). The finding indicated that most respondents are not aware of any brands or businesses in FCT promoting CE practices (61.2%), never attended any CE practices program (85.2%), and not aware of government and media support on awareness of CE practices (60.2%); however, they are interested in learning more about circular economy and its applications (89.6%). There is a low level of awareness of CE practices and principles among consumers; hence, there is a need for enhanced awareness campaigns that incorporate various communication channels and develop targeted educational programs.

Keywords : Circular Economy, Sustainability, Recycle, Reduce, Reuse, Federal Capital Territory (FCT)

Introduction

Global industrialization, population growth, and urbanization have led to environmental exploitation and climate change impacts. The post-World War II construction boom increased resource consumption in the built environment (Guerra and Leite, 2021), accounting for the highest material usage, estimated at three billion tons annually (Afolabi et al., 2018; Suleman et al., 2023). This sector contributes significantly to energy consumption, pollution, emissions, and waste generation, representing 40% of global levels. The global circularity rate has declined from 9.1% in 2018 to 7.2% in 2023, according to the Circularity Gap Report. Urgent action is needed for cleaner and sustainable resource extraction and consumption processes (Selman and Gade, 2020; Suleman et al., 2023). The Circular Economy (CE) concept has emerged as a promising alternative to the current linear model (Ghisellini et al., 2016). CE, in general, aims to transform sourcing, production, distribution, and consumption processes to enhance environmental quality, economic prosperity, and social equity (Kirchherr et al., 2017). Achieving a circular economic system that eliminates waste represents a pivotal opportunity for sustainable value creation, with promising applications in the technology sector (Di Vaio

et al., 2023; Avrami et al., 2024). However, realizing circularity relies on consumer adoption of product-as-a-service offerings like device leasing that promote access over ownership. In other words, achieving circularity requires changes across product systems because purchasing and utilization patterns fundamentally determine material demand (Reike et al., 2023). The concept of circular economy (cyclic economy, closed-loop economy) or circular economy in a general sense defines an alternative to the traditional economic mechanism based on the renewal of resources and their closed use at all stages of the value chain (Avrami et al., 2024). The transition to full CE requires urgent and comprehensive action from all sections of society. The way products are designed, manufactured, used and managed at the end of their useful life is highly significant and has ramifications in a number of areas, including the demand for natural resources, the impact of climate change and the amount of waste generated. Thus, regulators, businesses and consumers, have an important role to play in advancing circular solutions.

Transitioning to a circular economic model represents an imperative for sustainable development across industries; however, achieving circularity relies on consumer adoption of product-as-a-service systems and responsible purchasing patterns that fundamentally determine material demand (Reike et al., 2023; Avrami et al., 2024). However, research indicates low levels of consumer acceptance and demand for sustainable product innovations like recyclable packaging redesigns, compostable containers, and circular electronics leasing programs (Steenis et al., 2018). Consumer behaviour changes and responsible consumption choices are crucial for enterprises and industries to adopt circular flows replacing one-way linear resource models that contribute to packaging waste externalities (Marrucci et al., 2022). Furthermore, studies document consumer skepticism and negative perceptions about new or unfamiliar circular packaging solutions that create risk, uncertainty, and stagnation regarding business model transformations toward circularity across value chains (Steenis et al., 2018). The crux of the adoption problem for scaling circular economy principles is attitudinal barriers and lack of purchasing for available circular product offerings, which hamper system-level change (Avrami et al., 2024).

The emphasis made by CE is on reducing, reusing, and recycling materials to extend their lifecycle. The lifecycle

of products is divided into different stages, including design, production, consumption, and end-of-life. “Reduce” entails minimizing the use of raw materials and energy during the production process while “Reuse” is to encourage the extension of product lifespan by repairing, refurbishing, or repurposing items, and “Recycle” is the process of recovering materials from products at the end of their lifespan to create new products, closing the loop and reducing the demand for virgin resources. By incorporating strategies such as product durability, easy repairability, and material recycling, the circular economy seeks to extract maximum value from resources while minimizing environmental impact. Also, Heshmati (2015) indicated that implementing CE based on the 3R principles (of material use reduction, reuse and recycling) is embedded in both production and consumption as the flow of materials and energy penetrates both these areas. Elaborating on the principles and flows, Zhu and Qiu (2007) see CE as a sustainable economic growth model which aims at effective use and circulation as the principle. It also considers low demand and consumption, low emissions and high materials, water and energy use efficiency in production and maximizes uses of renewable resources as core characteristics. Considering the CE principles towards its adoption, the study considers the extent of consumer awareness of CE principles and practices in the Federal Capital Territory (FCT), Nigeria.

Methods and Materials

Study Area

Federal Capital Territory (FCT), Abuja is located centrally in Nigeria and is the nation's capital city (Figure 1). Kaduna borders Abuja to the north, Niger state to the west, Nasarawa state to the east and southeast, and Kogi state to the southwest. Abuja was officially named the capital of Nigeria on December 12, 1991 (Wambebe & Duan, 2020). Abuja is found on latitude 7° 25" and 9° 20" North of the Equator and longitude 5° 45" and 7° 39" East of the Greenwich. The overall land area is 7315 km². Abuja's population currently surpasses 2.5 million people and the population has grown by over 140%, making it the fastest-growing metropolis in Africa and one of the most rapidly expanding globally (Wambebe & Duan, 2020). The FCT is made up of six (6) area councils which are further sectioned into phases and districts. For the study, Abuja Municipal Area Council (AMAC) and its phases (5) were selected for the study. The choice of the area council was due to the high level of mixed socio-economic status among various area councils and districts of AMAC.

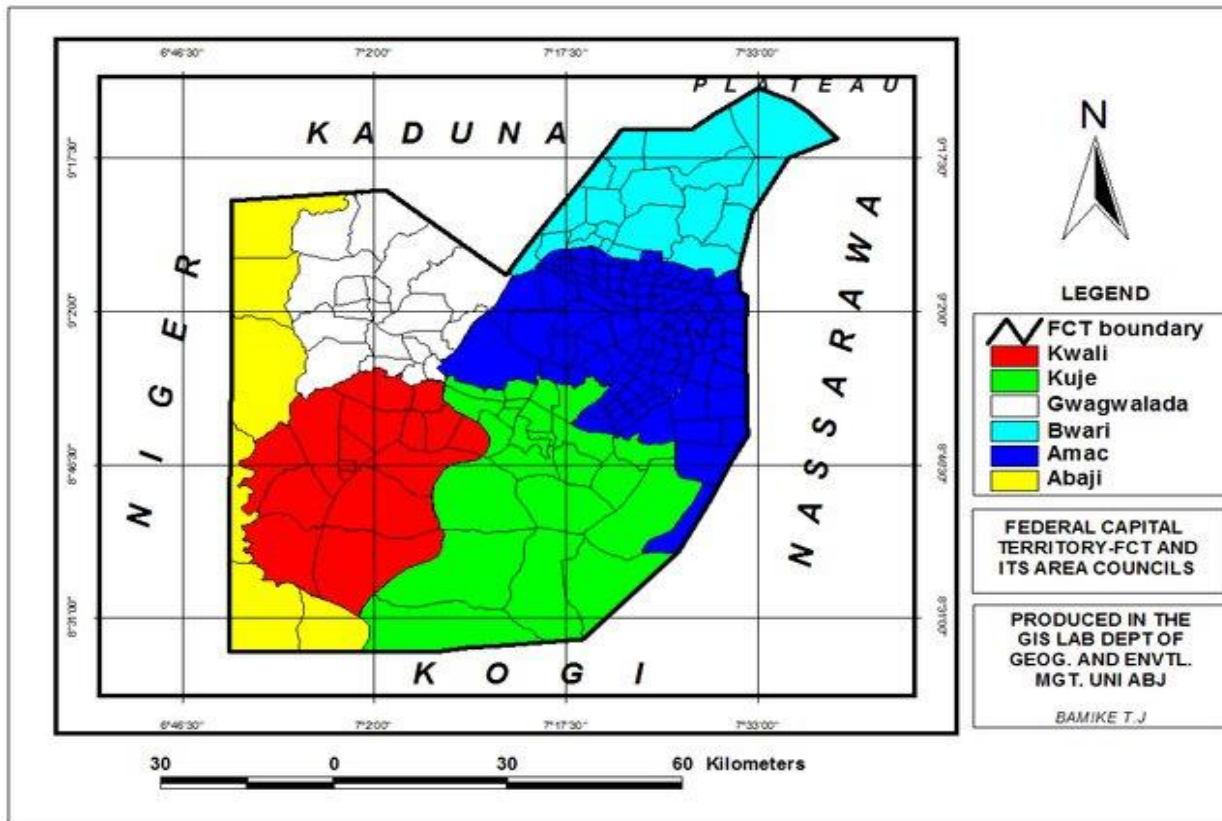


Figure 1: Overview of the Study Area

Research Design and Study Population

The cross-sectional survey research method was adopted in carrying out the study. Cross-sectional survey research is a specific type of field study that involves the collection of data from a sample of elements drawn from a well-defined population through the use of a questionnaire (Visser et al., 2002). The population of the study comprised all the respondents (households, working class, business outlets) randomly selected from the city phases and districts of FCT as presented in Table 1. The inclusion/exclusion criteria of the study ensure that the study was limited to randomly selected respondents within the selected districts.

Sample and Sampling Technique

Based on the inclusion/exclusion criteria, eight (8) districts within the AMAC (AMAC) were selected for the study. To have proper coverage, the National Population Commission data of 2006 of AMAC was used as the base year (778,567) and projected to 2023 using an annual growth rate of 3.2%. To get an optimum sample of the target population (1,339,135) the Taro Yamane (1967) formula for sample size determination will be adopted;

$$n = \frac{N}{1 + N(e^2)}$$

Where: e= Level of precision (0.05), N= Population, n= Sample size, 1= Constant

$$n = \frac{1339135}{1 + 1339135 (0.05^2)}$$

$$n = \frac{1339135}{1 + 1339135 \times 0.0025}$$

$$n = \frac{1339135}{1 + 3347.84}$$

$$n = \frac{1339135}{1 + 3348.84}$$

$$n = 400$$

The sample size was equally distributed among the districts where fifty (50) respondents were randomly selected from each district making a total sample size of 400. A total of 400 copies of the questionnaire were purposively administered using a simple random sampling technique.

Table 1: Population of the Study

FCT Area Councils	Phases and Districts	Selected Districts
Abaji, Abuja Municipal Area, Bwari, Gwagwalada, Kuje, Kwali	Phase I: Asokoro, Central Area, Garki, Guzape, Maitama, Wuse I and Wuse II	
	Phase II: Apo Dutse, Dakibiyu, Duboyi, Durumi, Gaduwa, Games Village, Kaura, Gudu, Jabi, Jahi, Kado, Katampe, Kukwaba, Mabushi, Utako, Wuye	Asokoro, Central Area, Garki, Guzape, Maitama, Wuse I, Wuse II, Utako
	Phase III: Galadimawa, Gwarinpa, Kabusa, Karmo, Life Camp, Lokogoma, Nbora	
	Phase IV: Idu, Karsana	
	Suburbs: Dawaki, Kubwa, Kuje, Lugbe, Mpape	

Data Collection and Analysis

The questionnaire was used to elicit information from respondents. The questionnaire adopted for the study made use of a closed-ended format. The retrieved questionnaires were coded and subjected to Statistical Package for the Social Sciences (SPSS) for proper analysis. The questionnaire coding was done with MS Excel before being transferred to the Data entry of SPSS. The data were analysed using descriptive statistics such as frequency counts, percentages, mean and charts. The use of such statistics allows the researcher to present the evidence of the study in a way that can be understandable and make a conclusion concerning the variables of the study.

Result

Socio-Demographic Details of the Respondents

The socio-demographic details of the respondents are presented in Table 1. The analysis revealed that 51.1% of the respondents were male while 49.0% were female. Also, the age of the respondents indicated that most respondents are within the age group 36-45 years which represents 38.0% of the respondents while the least of the respondents are within the age range of 56 years and more and represents 2.1% of the respondents. Considering the level of education of the respondents, the outcome revealed that 61.2% have attained higher level education, 21.9% of the respondents have attained secondary level education while 14.8% and 2.1% of the respondents have attained primary level education and no formal education respectively. Regarding the employment status of the respondents, 53.4% of the respondents indicated being employed, 28.6% indicated

being self-employed while 17.2% and 0.8% of the respondents are unemployed and students respectively. On the monthly income level, 67.4% of the respondents indicated earning less than N100,000 monthly while 27.9% and 4.7% of the respondents indicated earning between N100,000 – N500,000 and above N500,000 monthly.

Consumer Awareness of Circular Economy Principles and Practices

The feedbacks regarding consumer awareness of circular economy principles and practices were examined and presented in Table 2. From the outcome, 39.3% of the respondents indicated that being aware or heard of the term circular economy before while 46.4% and 14.3% of the respondents indicated not having heard or not sure of the term circular economy respectively. Among the respondents, 50.0% suggested having heard about the circular economy through social media, 25.0% of the respondents indicated news articles and blogs while 11.7% and 10.2% of the respondents suggested having learned about the circular economy through educational institutions and government programs respectively. Considering the level of understanding of the circular economy, 17.7% of the respondents indicated having very good understanding, 14.8% indicated good level understanding, 21.9% indicated not full understanding while 9.9% and 35.7% of the respondents indicated having limited understanding and no knowledge of circular economy respectively. On the concept of a circular economy that the respondents are familiar with, 22.1% of the respondents indicated recycling, 34.9% indicated reusing products, 21.4% of the respondents

indicated repairing damaged products, 12.5% of the respondents indicated sustainable packaging while 6.5% and 2.6% of the respondents indicated upcycling and product take-back program respectively. Among the respondents, 29.5% agreed that circular economy practices help in reducing environmental pollution while 3.1% and 67.4% disagreed and were not sure respectively. On the awareness of any brands or businesses in FCT promoting circular economy practices, 14.8% of the respondents indicated knowing few brands and 24.0% and 61.2% of the respondents heard of some, but were not sure and not aware respectively. Also,

85.2% of the respondents have never attended a workshop, seminar, or event on circular economy principles while 14.8% of the respondents have. Considering government and media support for awareness about circular economy practices, 11.7% of the respondents indicated sufficient support while 28.1% and 60.2% indicated to an extent but not sufficient and no awareness respectively. Among the respondents, 89.6% indicated have interest in learning more about the circular economy and its application while 5.2% of the respondents are not sure.

Table 1: Socio-Demographic Details of the Respondents

Variable	Frequency (n=384)	Percentage (%)
Sex of Respondents		
Male	196	51.0
Female	188	49.0
Age (years)		
18- 25years	91	23.7
26 – 35 years	113	29.4
36 – 45 years	146	38.0
46 – 55 years	26	6.8
56years and Above	8	2.1
Level of Educational		
No Formal Education	8	2.1
Primary Education	57	14.8
Secondary Education	84	21.9
Higher Education	235	61.2
Employment Status		
Student	3	0.8
Employed	205	53.4
Self-Employed	110	28.6
Unemployed	66	17.2
Monthly Income Level		
Low (< N100,000)	259	67.4
Medium (N100,000 – N500,000)	107	27.9
High (Above N500,000)	18	4.7

Discussion

Most respondents were not aware or heard of the term circular economy before while those who had heard about the term suggested to had heard about circular economy through social media news articles and blogs. The limited awareness of CE among respondents is similar to the report of Onyowoicho et al. (2021) which asserted that CE practice is at its infant stage in most developing countries such as Nigeria. A similar outcome was reported in the study conducted by Katigbak and Villaruel (2023) which indicated low knowledge about CE among women-led micro, small, and medium enterprises (MSMEs). The finding corroborates with the suggestion of Vidal-Ayuso et al. (2023) which asserted

that attitude and knowledge are the most influential elements in the consumer's buying decision-making process. The outcome revealed that most respondents have no knowledge of circular economy although they are familiar with terms such as reusing products, repairing damaged products and recycling. The finding indicated that most respondents are not aware of any brands or businesses in FCT promoting circular economy practices and have never attended any workshop, seminar, or event on circular economy principles. The outcome is similar to those reported by Suleman et al. (2023) which asserted a low level of knowledge regarding firm or built environment engagement in CE; although, the reported percentage (54%) was lower than

the present study. Limited knowledge of the advantages of CD adoption by the firms and clients could have hindered the uptake (Adams et al., 2017).

Table 2: Consumer Awareness of Circular Economy Principles

Variable	Frequency (n=384)	Percentage (%)
Have you heard of the term "Circular Economy" before?		
Yes	151	39.3
No	178	46.4
Not Sure	55	14.3
First Learn About The Circular Economy		
Social Media	192	50.0
News Articles/Blogs	96	25.0
Educational Institutions	45	11.7
Government Programs	39	10.2
Others	12	3.1
Level of Understanding of Circular Economy Practices		
Very good Understanding	68	17.7
Good Level Understanding	57	14.8
Not Fully Understood	84	21.9
Limited Understanding	38	9.9
No Knowledge	137	35.7
Concept of Circular Economy you are familiar with		
Recycling	85	22.1
Reusing Products	134	34.9
Repairing Damaged Products	82	21.4
Sustainable Packaging	48	12.5
Upcycling	25	6.5
Product Take-Back Programs	10	2.6
Circular Economy Practices Help In Reducing Environmental Pollution		
Yes	113	29.5
No	12	3.1
Not Sure	259	67.4
Aware of Any Brands or Businesses in FCT Promoting Circular Economy Practices		
Yes, I know a few brands	57	14.8
I have heard of some, but not sure	92	24.0
No, I am not aware of any	235	61.2
Ever Attended A Workshop, Seminar, Or Event On Circular Economy Principles		
Yes	57	14.8
No	327	85.2
Government and Media Provide enough Awareness about Circular Economy Practices		
Yes, and Sufficient	45	11.7
To an extent but not Sufficient	108	28.1
No awareness	231	60.2
Interested in Learning more about the Circular Economy and its Application		
Yes	344	89.6
Maybe	20	5.2
No	20	5.2

From the outcome, it was revealed that most respondents are not aware of government and media support on awareness about circular economy practices; however, they are interested in learning more about circular economy and its applications. The outcome was similar to the notion of Kirchherr et al. (2018) which suggested insufficient awareness of CE adoption. Similarly, Ghisellini et al. (2018) highlighted knowledge barriers as the main obstacles in their study. The findings share similarities with the study conducted by Suleman et al. (2023) which suggested a low level of CE knowledge in the architecture, engineering, construction, and operation (AECO) sector. According to Bawa et al. (2024), consumer education can transpire in the form of advertising that stresses quality and or labels, packaging and supplementary facts that offer comprehensive information on genuine locally made products.

Conclusion

To transform sourcing, production, distribution, and consumption processes to enhance environmental quality, economic prosperity, and social equity, the circular economy has emerged as a promising alternative to the current linear economy across the world. As the world tends towards embracing the new concept, the level of awareness and perception towards the ideal remains an important factor in its adoption. The outcome of the study revealed that the level of awareness is low with no knowledge of the circular economy although they are familiar with terms such as reusing products, repairing damaged products and recycling. There is a need for enhanced awareness campaigns that incorporate various communication channels and develop targeted educational programs that address specific knowledge gaps and provide practical guidance on integrating CE principles into daily routines.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Credit Authorship Contribution Statement

Aimiuwu, D.O.: Conceptualization, Methodology, Formal analysis, Investigation, Resources, Data curation, Visualization, Project administration, Writing - original draft. **Adesope, O.M.** and **Ifeyanyi-Obi, C.C.:** Supervision, Methodology, Validation, Formal analysis, Data curation, Visualization, Review & Editing.

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