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1. Introduction

There has been a rise of the word 'sustainable' used in various contexts and expressions, such as green, environmentally-friendly or eco-friendly. Most of these expressions are associated with developing countries (Khandelwal and Saxena, 2010; Minton et al., 2012). Hence, the global attention of environmental sustainability with a focus on the negative consequences towards the environment. (Holden et al., 2014; Bohner and Schlüter, 2014). The lack of environmental sustainability has led to the deliberating and conversing of solutions to extensively address the growing concerns worldwide (Greaves et al., 2013). Environmental sustainability has been executed in various ways, mainly focusing on the moral and cognitive aspect (Chan and Bishop, 2013; Greaves et al., 2013). Such as studying the behaviours associated with recycling (Goldstein et al., 2008; Bohner and Schlüter, 2014). In contrast, others focus on a more hands-on approach, such as emphasising the role of recycling or ways to implement recycling towards environmentally sustainable implementation (Oreg and Katz-Gerro, 2006; Jakovcevic and Steg, 2013).

Recycling plays a significant role in promoting environmental sustainability, as recycling is a sustainable way of re-using and processing previously used materials to effectively reduce waste sent to the landfill (Khalil et al., 2017). Recycling has mainly been adopted by developed countries such as the U.K, as seen by how they successfully increased their recycling ability to 45% of waste being recycled in 2019 (Priestley, 2020). In contrast, recycling has proven a challenge for national and local authorities in developing countries like Nigeria. With their federal government attempting and failing to tackle this problem (Otitoju, 2014). Public awareness of recycling in Nigeria is still low compared to other countries because recycling in Nigeria is still in its infancy compared to the rest of the world. It is estimated that only a fragment of the million metric tons of waste produced annually is recycled (Benson, 2020). Although the Nigerian government has recognised recycling as an effective strategy towards environmental sustainability, these practices are barely existent due to different factors such as lack of individual attitude to recycle and lack of technical resources and training at a local level to tackle the problem (Otitoju, 2014). The author further posited that there needs to be a behavioural change that will provide an initial reason or incentive to participate in this course of action to get Nigerians to recycle. Khalil et al. (2017) added that this is mainly due to their lack of knowledge and attitude towards recycling. Therefore, this research argues that there needs to be an urgent recognition that the objective realities of recycling are also fundamental issues affecting developing countries like Nigeria. Hence, this research addresses implementing recycling management based on Nigerian characteristics by expanding the theory of planned behaviour to create a new framework for establishing environmental sustainability through recycling in Lagos, Nigeria.

2. Literature review

A review of some literature on recycling behaviour reveals that TPB is a dominant theory for implementing recycling behaviours, especially when an individual is asked to decide on a course of action (Ramayah et al., 2012). According to Ajzen's (1991), three bieliefs are essentials to the formation of TPB: attitudes, subjective norms, and perceived behavioural control (Bamberg et al., 2003). However, most of these studies were carried out in developed and economically stable countries such as Europe and the USA (Darby and Obara 2005; Sidique et al. 2010; Andersson and von Borgstede 2010). Thus it is pertinent to ascertain the validity of these theories in other cultural settings of developing and low economic countries such as Nigeria. For example, their attitude towards recycling, government trust and available policies. According to Peabody et al. (2020), it is crucial to focus on those countries' characteristics to understand better the complexity of how the framework is anchored on the central issues affecting efficiency toward recycling (Bakare 2020). As a result, there is no clear framework on how to implement effective recycling in Nigeria.

Studies in social psychology have identified the ability of social norms to affect an individuals behaviour (Manstead, 2000; Cialdini and Goldstein, 2004; White et al., 2009; Smith et al., 2012; Kinzig et al., 2013 showing how external social pressures significantly increase an individual's willingness to participate in behaviour such as recycling. Which in turn encourages collectivism. Agents of socialisation such as peers and family are crucial influencers towards encouraging individuals to adopt various attitudes, norms, behaviours and values (Lee, 2011). This idea is consistent with Smith et al. (2012), who posited that individuals tend to be influenced by the

extent to which they feel others engage in a given behaviour. In context, collectivism has been cultivated within the Nigerian cultures, instead of individualism, as others influence individuals within the community (Adejumo and Adejumo, 2014). Based on this, the following hypothesis has been purposed

***H1a**: social norms is positively related to collectivism*

***H1b**: collectivism is positively associated with recycling intentions*

Attitude refers to an individual's negative or positive feeling towards a particular behaviour. Personal attitudes are based on an individual's perception of an activity being good or bad, wrong or right, helpful or not helpful, undesirable or desirable. Attitude has been a relatively stable and persistent construct within psychological studies, with researchers such as (Olson et al., 2001; Solomon et al., 2010; White and Hyde, 2012) showing a correlation between an individual's attitude and intention to recycle. Positive attitudes mean the optimistic belief in an indiviuals self such as the belief that recycling would lead to environmental sustainability. The majority of these studies have shown that when individuals have a positive attitude towards their intention to recycle, it increases participation in that behaviour (Nigbur et al., 2010). According to Ajzen and Fishbein (1977), recycling-specific attitudes should be better predictors of recycling than general environmental attitudes. Attitudes are believed to affect behavioural intention directly due to the assumption essentially borne out in research on the relationship between attitudes and attitudes toward recycling. Based on this argument, the following hypothesis is proposed

***H2**: Attitudes is positively related to recycling intentions*

Inconvenience refers to an individual's belief of how difficult recycling is or perceived. For example, taking up too much time could result in an individual reeling recycling to be inconvenient (Barr et al., 2001). According to Tonglet et al. (2004), inconvenience has commonly been assumed to be a barrier towards effective recycling behaviour. The convenience of recycling infrastructure is significant towards determing recycling behaviours and increasing an individual towards engaging in recycling activities. Wan et al. (2012) consider convenience as space, time and perceived ease of an individual in managing their waste. Multiple studies towards recycling behaviours (Domina and Koch 2002; Tonglet et al., 2004; Kelly et al., 2006; Wan et al., 2012) have mentioned convenience as an essential factor influencing an individual to hold a positive attitude recycling. A study conducted by Kelly et al. (2006) found a higher participation outcome to employees and students towards recycling when it is more convenient.

***H3**: Individuals who perceive recycling as "inconvenient" will have a less favourable intention to recycle*

The higher the level of trust, the more engaged an individual will be towards recycling (Bell et al., 2000). Therefore, intrinsically involved individuals are likely to perceive trust towards pro-environmental activity such as recycling. According to Daugbjerg et al. (2014), individuals who address environmental issues are more likely to sacrifice their behaviours. Knowledge of the impact on the behaviour can positively affect their recycling intentions (McEachern and Warnaby, 2008). Therefore the following hypothesis is proposed.

***H4**: Trust is positively related to recycling intention as more trusting individuals show a more positive attitude towards the behaviour*

The growing awareness of recycling can be linked to autonomous motivation and self-determination theory (SDT) (Bozuwa, 2006; Davis, 2010; Jones et al., 2014). This is due to the frequent engagement of individuals in pro-environmental activities that are consistent with their inner self and are in line with their goals and values (Kollmuss and Agyeman, 2002). Hence when an individual is motivated to be a pro-environmentally concussion, their intention to recycle is likely to increase (Ryan and Deci, 2000; De Groot and Steg, 2010). Based on this, the following hypothesis is purposed

***H5**: Motivation is a predictor of recycling intention*

Word of mouth (WOM) strongly affects intention, which can be seen in studies such as (Garnefeld et al., 2013; East et al., 2017) on word of mouth on purchasing intention. However, these strong effects make it worthwhile to study the factors associated with the impact of WOM. Two factors that may affect the impact of WOM are how the information is perceived, and the message, as well as an incentivised referral, may have a direct effect on the individual doing the referring (Garnefeld et al., 2013)

***H6**: There is a positive relationship between Word of Mouth and recycling intention*

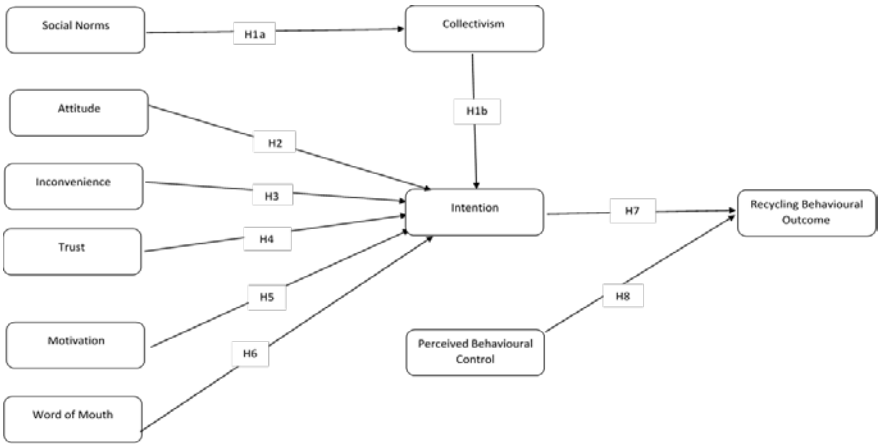
Behavioural criteria consist of an individual performing more than one observable action, which will result in a behavioural act such as recycling. The transition from an intention to recycle to the behavioural manifestation involves forming an active recycling relation that enacts the benefits of the relationship. Different contextual and personal conductions can influence an attitudinal intention toward a negative or positive activity or service (Hai et al., 2007). An individual's willingness tends to be reflected in the implementation of behaviour and the promotions and constraints from the situation (Santos, 2008).

H7*: Recycling intention is positively related to recycling behaviour*

PBC refers to the problematic perception of an individual towards a particular behaviour. According to Ajzen (1985 and 2002), there are two aspects of PBC: control belief and perceived intensity, restraining or promoting behaviours towards the individuals' self-efficacy. Some factors inhibit or encourage participation toward recycling, as the more confident the individual is towards recycling, the stronger their willingness to participate in recycling (Matthie et al., 2012). Based on this argument, the following hypothesis is proposed

H8: PBC is positively related to recycling intention

Figure 1: Conceptual Framework



3. Methodological approach

This study uses quantitative analysis to investigate the recycling behaviour within the proposed augmented TPB model. The target population of this study is Lagos, Nigeria, a representative city of developing countries.

Sample Profile

The sample characteristics were summarised in Table 1. The respondent's age ranged from 18 to 74. Out of the 530 respondents, 500 were valid, as the other 30 had missing values. 58.8% were men, and 41.2% were women. The income was low to medium, as 29% of the sample earned a monthly income of more than ₦ 199,000 ($490). Most of the respondents had graduated with a four-year degree or higher (83%). Additionally, 24% of the respondent have never recycled. In addition, 91.2 % believe re-using is a form of recycling, while 6.2% do not believe re-using is a form of recycling.

Table1: Demographics of respondents (n=500)

Demographics	Frequency	Percentage %
Sex		
Male	294	58.8
Female	206	41.2
Age		
18-24	67	13.4

25-34	158	31.6
35-44	161	32.2
45-54	93	18.6
55-64	20	4.0
65-74	1	.2
Education		
Secondary school	51	10.2
2 year degree	34	6.8
4 year degree	293	58.6
Professional degree	122	24.4
Monthly Income ₦		
25,000 and below	22	4.4
25,000- 49,999	51	10.2
50,000- 79,999	69	13.8
80,000 -99,999	52	10.4
100,000- 199,999	145	29.0
200,000- 150,000	94	18.8
150,000 and above	50	10.0
Prefer not to say	17	3.4
Re-using as a form of recycling		
Yes		
No	455	91.2
Do not know	34	6.8
	10	2.0
Have you ever recycled		
Yes	379	76.0
No	120	24.0
How often do you recycle		
Always	61	16.2
Usually	100	26.5
Sometimes	173	45.9
Rarely	42	11.1
Never	1	.3
Total	377	100

Data analysis and results

Structural Equation Modelling

This study used PLS-SEM to help analyse the data. Smart-PLS was chosen based on its advantage of handling non-normal data explaining the variance among target constructs. Two phases are carried out using PLS-SEM: the measurement model, also known as the outer model, and the structural model assessment, which focuses on hypothesis testing. The first step of structural equation modelling is the measurement model assessment. This process is confirmatory factor analysis, where the convergent and discriminant validity of the measurement model are evaluated. As seen in Table 2, the measurement model concurrent validity statistics results are displayed, meeting the three permissible levels for secure convergent validity. Firstly, the assessment of the factor loading was checked, and factors loading of less than 0.6 were removed (Truong and McColl, 2011; Ertz et al., 2016). This is also known as internal reliability. Secondly, the composite reliability (C.R.), which calculates the internal consistency, exceed the benchmark of 0.7 (Aziz and Afaq, 2018; Joo et al., 2020). And the average variance extracted (AVE) of each construct needed to be bigger than 0.5 Fornell and Lacker (1981). The lowest value of AVE was 0.527. The results of the measurement model statistics indicate that the model can be analysed.

TABLE 2: Validity and Reliability for Constructs

Construct	Items	Loading	AVE	CR
Attitude	A1 A2 A3 A4 A5	0.742 0.778 0.712 0.739 0.744	0.553	0.861
Social Norms	SN1 SN2 SN3 SN4 SN5 SN6	0.718 0.774 0.762 0.697 0.806 0.777	0.572	0.889
Perceived Behavioural Control	PBC1 PBC3 PBC4 PBC5 PBC6 PBC7 PBC8 PBC9	0.729 0.717 0.680 0.692 0.705 0.775 0.798 0.763	0.538	0.903
Trust	T1 T2 T3 T4 T5	0.851 0.761 0.762 0.786 0.764	0.617	0.890
Motivation	MOT1 MOT2	0.882 0.771	0.686	0.813
Collectivism	COL1 COL3 COL4	0.779 0.777 0.719	0.576	0.803
Inconvenience	INC1 INC3 INC5	0.822 0.835 0.783	0.662	0.854
Word Of Mouth	WOM1 WOM2 WOM3 WOM4	0.810 0.697 0.768 0.774	0.527	0.846
Behaviour	B2 B3 B4 B5	0.793 0.780 0.767 0.730	0.589	0.852
Intention	IN1 IN3 IN4 IN5	0.704 0.703 0.784 0.767	0.548	0.829

The results for the discriminant validity test can be seen in Table 3. When getting a discriminant validity, each construct AVE square root needs to exceed the inter-construct correlations (Joo et al., 2020). The discriminant validity results of the Fornell and Lacker (1981) criterion and the HTMT ratio was obtained by running an algorithm in SmartPLS (Hair et al., 2014). In conclusion, the study model gained a satisfactory validity that is acceptable for analysis.

TABLE 4 Discriminant Validity										
Constructs	1	2	3	4	5	6	7	8	9	10
Attitude	**0.743**									
Behaviour	0.305	**0.768**								
Collectivism	0.612	0.495	**0.759**							
Inconvenience	-0.296	-0.264	-0.288	**0.813**						
Intention	0.604	0.549	0.65	-0.335	**0.74**					
Motivation	0.534	0.447	0.606	-0.25	0.607	**0.828**				
Perceived Behavioural Control	0.183	0.718	0.339	-0.14	0.344	0.357	**0.733**			
Social Norms	0.094	0.439	0.262	0.041	0.257	0.257	0.599	**0.757**		
Trust	0.059	0.384	0.209	0.061	0.228	0.25	0.574	0.782	**0.786**	
Word Of Mouth	0.555	0.647	0.694	-0.323	0.733	0.619	0.508	0.352	0.313	**0.726**

Structural Model

After completing the measurement model or outer model, the next step was to examine the structural model. For this purpose, the R2 and Q2 values were used to calculate predictive relevance and the relationships among the reflective constructs. As seen in Table 4, the R2 for the Behaviour (62%), Intention (63%) and Collectivism (7%). The blindfolding technique was run on SmartPLS to predictive relevance to assessing predictive relevance. According to Hair et al. (2014), Values as per Q 2 > 0 show adequate predictive relevance. The Q2 value to the behaviour was 0.343, and the intention was 0.318. Both behaviour and intention signify that the model had an acceptable explanatory power, as a value of 0.20 is considered high in behavioural sciences (Hair et al., 2014).

Table 4 Goodness of Fit and Predictive Relevance

	R^2	Adj R^2	Q^2
Behaviour	0.624	0.622	0.343
Intention	0.637	0.633	0.318
Collectivism	0.074	0.072	0.035

Effect Size F Squared

F square is used to measure the contribution of an exogenous construct to R2 of its endogenous constructs. A guideline was provided by Cohen (1988) to show the contribution of the exogenous constructs to their respective endogenous construct. According to Cohen (1988), the effect size f2 of 0.02 is considered small, 0.15 as medium and 0.35 as large effect. Furthermore, as seen in Table 6, PBC has the highest contribution (0.830) towards behaviour, while WOM has the highest contribution to intention (0.186). Trust, on the other hand, has the lowest percentage change (0.002) to intention.

TABLE 5 Hypothesis Testing

Hyp	Relationship	**Path Coeff(β)**	**T Statistics**	**p-Values**	**F Square**	**Decision**
H1a	Social Norms -> Collectivism	0.268***	6.556	0.000	**0.074**	Supported
H1b	Collectivism -> Intention	0.129*	2.222	0.027	0.019	Supported
H2	Attitude -> Intention	0.200***	3.658	0.000	**0.055**	Supported
H3	Inconvenience -> Intention	-0.074*	2.494	0.013	0.012	Supported
H4	Trust -> Intention	0.028	1.096	0.274	0.002	Not supported
H5	Motivation -> Intention	0.144**	2.656	0.008	**0.028**	Supported

H6	Word Of Mouth -> Intention	0.411***	5.626	0.000	**0.186**	Supported
H7	Intention -> Behaviour	0.34***	9.247	0.000	**0.271**	Supported
H8	Perceived Behavioural Control -> Behaviour	0.604***	17.782	0.000	**0.830**	Supported

** p < 0.05, ** p < 0.01, *** p < 0.001 / F square (in bold) > 0.02*

As seen in Table 5, the estimates were achieved for the path coefficients to test the hypotheses through the PLS-SEM algorithm. A bootstrapping technique was used on the data with 5,000 valid sub-sample to hypothesise the relationship among the constructs. Table 6 suggests that H1a, H2, H6, H7 and H8 are highly significant as their P-values are less than 0.005. H1b, H3 and H5 are also statically significant and were supported. The finding demonstrates that collectivism, attitude, inconvenience, motivation, and word of mouth positively and significantly affect individuals' intention to recycle in Lagos, Nigeria. In addition to perceived behavioural control having a positive and significant effect on individuals' recycling behaviour in Lagos, Nigeria. However, H4 was found to be not significant and was the hypothesis was not supported. Subsequently, this should be excluded from the model.

The moderating effect of collectivism on social norms to intention was significant, along with the moderating effect of intention on recycling behaviour. Particularly, the total effects of an independent variable over the dependent variable are always more significant due to the interacting indirect effect. The direct, indirect and total effects are reported in Table 6.

Table 6. Direct and Indirect Effect Table

	Direct Path Coeff(β)	**Indirect Path Coeff(β)**	**Total Path Coeff(β)**	**Direct P - Values**	**Indirect P -Values**	**Total Effect P -Values**
Attitude -> Behaviour	-	0.068	0.068	-	0.001	0.001
Attitude -> Intention	0.200	-	0.200	0.000	-	0.000
Collectivism -> Behaviour	-	0.044	0.044	-	0.028	0.028
Collectivism -> Intention	0.129		0.129	0.027	-	0.027
Inconvenience -> Behaviour	-	-0.025	-0.025	-	0.013	0.013
Inconvenience -> Intention	-0.074		-0.074	0.013	-	0.013
Intention -> Behaviour	0.340		0.340	0.000	-	0.000
Motivation -> Behaviour	-	0.049	0.049		0.014	0.014
Motivation -> Intention	0.144		0.144	0.008	-	0.008
Perceived Behavioural Control -> Behaviour	0.604		0.604	0.000		0.000
Social Norms -> Behaviour	-	0.012	0.012		0.044	0.044
Social Norms -> Collectivism	0.268		0.268	0.000		0.000
Social Norms -> Intention		0.035	0.035		0.039	0.039
Trust -> Behaviour		0.010	0.010		0.280	0.280
Trust -> Intention	0.0280		0.0280	0.274		0.274
Word Of Mouth -> Behaviour		0.140	0.140		0.000	0.000
Word Of Mouth -> Intention	0.411		0.411	0.000		0.000

4.0 Discussion

As stated earlier, there is a high priority on environmental protection. However, there is an increase in the lack of waste management strategies and policies, mainly in developing countries such as Nigeria. This study

shows that many individuals in Lagos, Nigeria, have engaged in recycling, as 76% of them reported yes to the question. It is probable to suggest that most recycling engagements have been through re-using items such as bottles or plastic containers. However, based on literature and the high percentage of participants (91.2%) who believed re-using to be a form of recycling.

Although the Theory of Planned Behaviour (TPB) remains to be commonly used in implementing pro-environmental behaviours such as recycling, to achieve success in developing countries such as Nigeria, there needs to be an introduction of constructs based on the countries characteristics. For example, motivation, WOM and collectivism to predict recycling behaviours in Lagos, Nigeria. More specifically, the addition of collectivism as a mediator to intention and perceived behavioural control directly to behaviours is essential in impacting Lagos's recycling behaviour. By testing the eight different hypotheses is seen in Table 6, with all hypotheses being significant to expect from H4 trust to intention, this study aims to augment the TPB to provide a unified theory for influencing recycling behaviour in Lagos, Nigeria.

With the standard TPB, attitude, PBC and S.N. are the sole predictors of recycling intention. But this study implements Social norms rather than Subjective norms due to the Nigerians willingness to conform to social cues and pressures rather than their personal inclination to do the right thing (Hage et al. 2009). The replacement of social norms for subjective norms was first argued by Schwartz (1977) that social norms might be personally adopted and thus become internalised, 'personal moral' norms. While this should have been found significant, this was not the case. Instead, there was a significant direct relationship between PBC and recycling behaviour and S.N. needing collectivism to mediate intention. A study on recycling in Greece by (Ioannou et al., 2013) found a similar lack of significance in the standard TBP in recycling behaviours.

It is encouraging that respondents are optimistic about their recycling intentions, especially when there is proper motivation alongside lack of inconvenience, word of mouth and collectivism. The results also suggest that the lack of trust within the Lagos population plays a significant role in incorporating recycling behaviour in Lagos. As seen by the lack of statistical significance between trust and recycling intention in Table 5

In Lagos, Nigeria, the recommendation to policymakers is to consider the convenience and motivation while incorporating the social aspect of communalism implementing recycling schemes and ideas. However, it is also essential to acknowledge that there needs to be community leaders' involvement due to the perceived lack of trust within the Lagos government and policymakers. This research implies that Lagosians can be more aware of recycling over time due to the behavioural shift from the current baseline for adapting recycling and recycling strategies that will improve the recycling behaviours of Lagosians and Nigerians. Nigeria should also be acknowledged for its diversity which can complicate the generalisation of Nigeria. Nevertheless, most of the other states in Nigeria share similar characteristics due to the common backgrounds found in most states.

Theoretical significance and contribution

The critical work on recycling within this thesis is based on Nigerian characteristics, as all the states in Nigeria, including Lagos, share these characteristics. Such as power distance and lack of government trust, value for community life, and lack of knowledge concerning the context of the country's policies and institutional factors affecting recycling. This, in turn, draws and elaborates the extension of existing work by scholars in the field of Theory of Planned Behaviour (TPB) which is the extension of the theory of reasoned action that includes measures of controlled belief and perceived behavioural control (Ajzen 1991). TPB has been utilised to investigate pro-environmental behaviours in previous studies (Davis and Morgan, 2008; Chen and Tung, 2010; Nigbur et al., 2010; Ramayah et al., 2012). However, few studies show TPB employed in Africa towards recycling, especially in Lagos, Nigeria (Khalil et al., 2017).

Furthermore, this study expands on TPB by including constructs such as social norms, trust, motivation, word of mouth, collectivism, and inconvenience based on the characteristics associated with Lagos, Nigeria. For example, internal ties within a community and collective cohesiveness (collectivism) lack adequate policies and attitudes towards recycling and government trust. According to Stern et al. (1993), individuals will participate in pro-environmental behaviour when their current situation activates their values. Hence this proposed model provides a suitable process to identify underlying mechanisms that motivate an individual in Lagos, Nigeria, to participate in recycling.

5. Conclusion

Many studies on recycling behaviours have used the TPB; however, most of those studies are focused on developed countries or countries with an established background in recycling. Nevertheless, this study has

made an essential contribution to the concept of TPB by incorporating additional constructs into the framework based on the countries characteristics. Furthermore, as mentioned earlier, limited studies have focused on the link between recycling behaviours and the features of the country. Therefore, it is recommended that in-depth studies be applied to this model to identify how this model can be used in other developing countries, especially countries with similar characteristics to Nigeria.

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