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The influence of climate change on business performance in the Riverine areas of South-South Region, Nigeria

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Abstract

The global climate change has continued to generate serious concern in the recent times especially with its increasing effect on business and human activities, as can be seen in Nigerian riverine areas. The objective of this study was to assess the influence of Climate Change on business performance in the riverine areas of the South-South region Nigeria. The study sought to: investigate the effect of rising sea levels; shrinking mountain glaciers and accelerating ice melting on businesses performance in the region. The study is survey research, sampling the opinion of 253 selected business operators in the area. Their opinion was collected using a structured questionnaire and data collected were analysed by simple regression method. The findings revealed that indeed, rising sea levels, shrinking mountain glaciers, and accelerating ice melting has significant effect on business performance in the region. The study concluded that Climate change in one way or the other affects businesses, economy and business environment. Mitigating climate change, addressing waste and pollution, and ensuring environmental sustainability are among the world's most pressing issues. It therefore recommended that Nigerian government should pay serious attention to the high rise in sea level through different environmental policies and legislation; government should also encourage voluntary mitigation to reduce emission of greenhouse gases and shrinking mountain glaciers to protect the environment. Also, there is the need for promoting businesses and environmental education; develop and put in practice adequate governance frameworks that enable the sharing and re-use of environmental data to recede or mitigate the effect of climate change in the riverine areas of Nigeria.

Keywords: Climate Change, Rising sea level, Shrinking mountain glaciers, Accelerating ice melting, Business Performance.

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1. INTRODUCTION

The survival and growth of new business is becoming worrisome because of the current adverse effect of climate change, especially in riverine areas of Nigeria. Climate change is widely considered to disproportionately affect the world and Africa in particular, with the rate of temperature rise and its attendant impacts, such as desertification, coastal erosion, loss of biodiversity and saltwater intrusion, increasing faster than on average throughout the world [1]. Climate change is a long-term change in the earth's climate especially a change due to an increase in the average atmospheric carbon dioxide produced by the use of fossil fuels [2].

Sustainable development cannot be achieved without Micro, Small, and Medium Enterprises (MSME) especially SDG 8, 9 and 13 (decent work and economic growth; industry, innovation and infrastructure; climate action) because MSMEs are the drivers of economic development around the world, providing long-term jobs and income even for the poorest. Their market power and potential for innovation make MSMEs key partners in achieving economic growth. But this can be hampered by the adverse effect of climate change [3].

The river dependent communities in Nigeria, characterized by their reliance on natural resources for sustenance and livelihoods, face profound vulnerabilities stemming from climate change impacts). Changes in temperature and precipitation patterns, heightened frequency of extreme weather events, and alterations in hydrological cycles have become palpable realities across the African continent, affecting agriculture, water availability, biodiversity, and local economies. These impacts are particularly pronounced in Nigeria riverine areas, where communities heavily reliant on natural resources face

heightened risks of food insecurity, water scarcity, and economic instability due to climate-induced changes [4].

Nigeria is particularly exposed to climate impacts because of its large population, extensive coastline, limited resources to adequately finance climate management from both the public and private entities and an adaptation knowledge gap. In many parts of the country, a combination of droughts, saltwater intrusion and sea level rise has adversely affected businesses, crop yields and urban infrastructure, leading to rising cost of business operations and transactions, cost of goods and services, high food prices, cost of development and other linked effects [3;5].

The sustainable Development Goals, anti-corruption and human rights initiatives and the climate challenge have all contributed to the notion that not only is collective action between the economic, business, public and private sectors warranted to address these challenges, but also that sustainability has become a compelling value-creating proposition for businesses. A very important driver for the sustainability agenda has become the climate challenge. Its impact and need for adaptation and mitigation go well beyond environmental issues. Its expected impacts cause it to be a global development, as well as an ethical issue, with profound demographic, global equity and security consequences.

Not with standing the fact that much economic investment is required to address this global challenge, the business sector is definitely part of the solution. Business must and will look at the climate challenge as an opportunity). The operations of the Emissions Trading System and the Clean Development Mechanism under the Kyoto Protocol have offered valuable lessons for a future agreement under the UN Framework Convention on Climate Change. The business sector should play an active role in defining the international and local political pro-climate agendas as well [6]

Climate change has affected business in various dimensions in Nigeria riverine and coastal regions in the area of, rising sea levels, shrinking mountain glaciers, and accelerating ice melting. Since climate change is now inevitable, putting strategies and measures in place to adapt to these changes also remains significant. The country's approach is to treat adaptation to climate change as an issue of climate-resilient development, rather than as a set of activities (flood defenses, drought plans, and so on), combining climate and development challenges into a single strategy. The aim is to protect the businesses, the business environment and the employees, human settlements and infrastructure, as well as energy supply among others from climate-related damages and to maximize the benefits from climate-related opportunities. This will prepare Nigerians for a climate-resilient future. The challenge for the country then is how to rapidly develop the economy and fulfill its obligation to the global climate change standard

It is in the light of this that this study intends to assess the effect of Climate Change on business Performance in the riverine areas, with particular emphasis on the South-South region of Nigeria.

On the whole, the specific objectives of the study are as follows:

i). To investigate the effect of Rising Sea Levels on business performance in the riverine areas of South-South region of Nigeria

ii). To find out the effect of Shrinking Mountain Glaciers on the business performance in the riverine areas of South-South region of Nigeria.

iii). To find out the effect of Accelerating Ice Melting on business performance in the riverine areas of South-South region of Nigeria

And the following hypothetical assumptions has been formulated for validation by the study:

$H0^1$: Rising Sea Level does not have significant effect on business performance in the riverine areas of South-South region of Nigeria

$H0^2$: Shrinking Mountain Glacier does not have significant effect on the business performance in the riverine areas of South-South region of Nigeria.

$H0^3$: Accelerating Ice Melting does not have a significant effect on business performance in the riverine areas of South-South region of Nigeria

2. Review of Literature and Theoretical framework

2.0 Conceptual Review

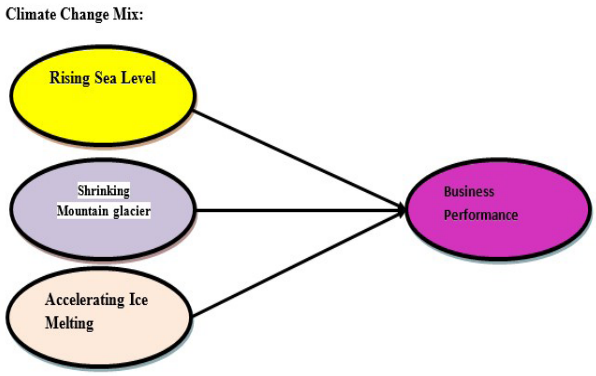

Fig. 1 Conceptual framework

Source: Researchers Conceptualization, (2024)

Figure 1: Conceptual model of the study showing the hypothesized relationships amongst the independent variables (Rising sea level, Shrinking Mountain glacier, Accelerating ice melting) and dependent variable (Business performance)

2.1 Climate Change

Climate change is a long term change in the earth's climate especially a change due to an increase in the average atmospheric carbon dioxide produced by the use of fossil fuels [2]. It refers to changes to the average weather and weather variability of a region or the planet over time. It is measured by changes in temperature, precipitation, wind, storms. Other important indicators include rising sea level, shrinking mountain glaciers and accelerating ice melting and average surface temperature are also used to measure climate change[7] . Global ocean temperature is also an important factor to consider due to its effect on surface temperatures. The world's oceans are absorbing much of the heat added to the earth's climate system and, as the ocean circulates, much of that heat is released into the atmosphere, increasing the warming effect over time [8].

a. Rising Sea Level

As Black, Arnell, Adger, Thomas & Geddes put it, sea level rise is an increase in the level of the oceans due to the effects of global warming[9]. Burning fossil fuels is one of the causes of global warming because it releases carbon dioxide and other heat-trapping gasses into the atmosphere. The oceans then absorb the majority of this heat. As water becomes warmer, it expands. This results in ocean levels rising worldwide. Land-based ice, such as glaciers and ice sheets, is greatly affected by global warming, as well. These reserves of ice are located in places like Greenland and Antarctica. Typically, they experience melt during the warmer months of the year and the ice is replenished in colder months. With the average year-round global temperatures rising, however, ice caps and glaciers are experiencing a disproportionate amount of melting at an accelerated rate [9]. According to Das and Swain (2024) rising sea levels are placing pressure on coastal areas, affecting their role in providing recreation, storm protection, and home to diverse marine life, including vital fisheries. Additionally, rising seas are polluting underground fresh-water sources, which are essential for towns, farms, and natural environments. If sea level rise causes damage to places and people become aware of it, it could have a serious impact on tourism. The loss of these economic activities will have a direct impact on the prosperity of businesses in those coastal areas [10]

b. Shrinking Mountain glacier

A glacier is a large, perennial accumulation of crystalline ice, snow, rock, sediment, and often liquid water that originates on land and moves down slope under the influence of its own weight and gravity [11;12]. Mountain glaciers are key indicators of climate change. Typically, glaciers exist and may even form in areas where: mean annual temperatures are close to the freezing point, winter precipitation produces significant accumulations of snow, temperatures throughout the rest of the year do not result in the complete loss of the previous winter's snow accumulation. Over multiple decades this continuing accumulation of snow results in the presence of a large enough mass of snow for the metamorphism from snow to glacier ice process to begin[9;10] According to Huss (2024) Even though glaciers are not living things, they are not lifeless. For many mountain regions worldwide, glaciers function similarly to lungs: They absorb snow in wintertime and "breathe" out water during hot summer days. This glacier water is urgently needed, especially in dry periods. Glaciers consequently have a relevance that goes far beyond the mountain peaks where they reside. A reduction in meltwater from glaciers would be painful for nature and the global economy: irrigation of fields would be restricted, the temperature and mineralization of rivers would change, and during periods of drought, serious bottlenecks could come into existence for the drinking water supply and for shipping on rivers. In addition, melting glacial ice contributes to sea-level rise and therefore directly or indirectly affects billions of people living near the coast [13].

c. Accelerating Ice Melting

Melting is a non-linear process due to positive feedbacks associated with temperature increase [11]. The melting of the ice sheet decreases surface albedo and consequently the surface absorbs more solar energy, leading to additional ice sheet melting. In addition, rising temperature can lead to increased liquid with respect to solid precipitation at high latitudes, which can increase the ice sheet mass loss. This mechanism occurs for the Greenland Ice unlike Antarctica, where an increase in solid precipitation makes the mass balance more complicated to predict. Finally, a fraction of mass loss is in relation to the glacier dynamic [14].

2.2. Business Performance

Performance can be simply seen as achieving set objective. It is the extent to which an organization, as a social system, could consider both its means and ends. Pepple et al (2024) stated that Business performance refers to the level at which a business is carrying out its activities and also, competing. It can also be used interchangeably with firm performance or just performance [15]. Business performance management (BPM) is an instrument that allows the fulfillment of business objectives and the improvement of competitiveness in small and medium-sized enterprises (SMEs). When BPM is implemented and measured, it can improve the sustainability and competitiveness of the enterprise.

Accordingly Organisational or business

Performance is the extent to which firm realize their stated objectives, and Performance is a measure firm's attractiveness. Business performance can be financial and non-financial. The proponents of each financial and non-financial performance measures tried to support their point of view [16]. Although the majority of the studies measuring organizational performance used the account-based measure, this study chooses the non-financial measures due to the following reasoning. Firstly, financial metrics of business performance are not quite stable hence making them sensitive to industry related change factors. Secondly, financial metrics can be easily manoeuvred preventing it from reflecting actual performance. Finally, the financial metrics lacks the long term focus since they mainly focus on past performance which in many cases can be misleading especially when used to predict the future performance [16].

This study focuses on the organizational outcome using service quality and survival strategy as a benchmark for measuring business performance. We conceptualises service quality as a measure of performance of business enterprises in the riverine areas of South-South region of Nigeria. The Service Quality concept is a combination of two different constructs, service and quality. Understanding service quality requires understanding the two constructs separately. Service is an abstract or intangible activity or benefit that an organization provides to customers. Quality on another hand is a relative and subjective term and is most often than not defined by the customer or the service receiver rather than the service providers. The judge of quality, therefore, has always and will most likely continue to be the customer. The customer judges the quality of a service and his/her perceptions create an image of good or bad quality. Bringing both terms together, service quality can be defined as customers perceiving an organization measures up to their needs and different cravings [16]. To attract satisfactory business performance is the basis for the enterprise 's survival and the principal reason for the existence of the business enterprises [17].

3.Theoretical Framework

This study is hinged on the following theories, namely Trickledown Theory and Resource-based view (RBV) theory:

Trickledown theory

The Trickledown Theory propounded by Anderson (1964), as stated by Orji, (2023) opined that laying much emphasis on the growth in the short run will substantially promote equality in the long run [18]. Accordingly six propositions are depicted by the theory which are linked in chronological order, these includes: (i) business can be encouraged so long as there is a direct profits to entrepreneurs or investors; (ii) such encouragement will hearten the growth of the enterprise; (iii) the profits realized from the growth will be invested or reinvested; (iv) new jobs will be created from the investment; (v) the jobs will assist in satisfying the total needs of poor persons employed; (vi) through earnings, savings and fresh opportunities in an open society including vocational training, education etc., consequently inequality may be reduce eventually. In line with this theory, the growth realized at first benefits only the high income groups which later descendent to lower income groups after sometimes. The wealth created by entrepreneur as well trickle down to other poor family members and the society through wealth distribution.

Based on this theory, business performance in line with Sustainable development goals 13,and 9, (climate action, industry, innovation and infrastructure) the trickledown theory was found to capture the relationship between these components of business performance and thereby been adopted for the study. Established on the premises of the theory, innovative activities of the climate change management and compliance (in line with SDG 13) in business activities provide direct profit (income) to the entrepreneurs or investors; the profit realized from the growth of the business will be invested and re-invested, and new jobs (employment) will be created from the investment; the earnings from the jobs will help to meet the needs of the society ; and through earnings, savings may be realized which can open opportunity for further training or education (human capital development), and consequently reduces inequality eventually (SDG 10).

Resource-based view (RBV) theory

The Resource Based View (RBV) was popularized in the work of Barney (1991) and Hamel and Prahalad (1996). The RBV theory analyses and interprets internal resources of the organizations and emphasizes resources and capabilities in formulating strategy to achieve sustainable competitive advantages [16;18]. Accordingly, these resources and capabilities can be viewed as bundles of tangible and intangible assets, including a firm's management skills, its organizational processes and routines, and the information and knowledge it controls. The RBV focuses on the concept of difficult-to-imitate attributes of the firm as sources of superior performance and competitive [19]. Resources may be considered as inputs that enable firms to carry out their activities. In line with this thought, Barney (1991) submitted that resources that are valuable, rare, inimitable and

non-substitutable make it possible for businesses to develop and maintain competitive advantages for superior performance [21]. According to RBV a resource is valuable if it provides strategic value to the firm. Resources provide value if it helps firms in exploiting market opportunities or helps in reducing market threats. There is no advantage of possessing a resource if it does not add or enhance value of the firm [16;18]. Resources must be difficult to find among the existing and potential competitors of the firm. Hence resources (like the knowledge of Marcus Garvey Orji) must be rare or unique to offer competitive advantages. Resources that are possessed by a several firms in the market place cannot provide competitive advantage, as they cannot design and execute a unique business strategy in comparison with others. This means making copy or imitating the resources will not be feasible [18].

Utami, & Alamanos (2023) on their view stated that there are two underlying assumptions of the Resource Based Theory (RBT) related to the explanation of how firm- based resources generate sustained competitive advantage and why some organisations may continually outperform others by gaining higher competitiveness [19]. First, the bundles of resources owned by firms are different from each other. One of the cornerstones of RBT is the heterogeneity of resources and capabilities in a population of firms, which differentiate the competitive advantage of each firm. The heterogeneity of resources assumes that a firm possesses unique resources in a specific situation can potentially be more skilled to perform particular activities and create competitive advantage. Second, the complexities of trading resources across firms may create persistence in differences in resources (the assumption of resource immobility). Theory assumptions of RBT begin with the assumption that organisational characteristics are not merely modified. The organisation needs to correct its orientation if it is to succeed and achieve sustainable competitive advantage. The dominant paradigm in determining a company's profits potential, such as the view of Porter (1989), suggests that a firm's internal factors, such as resources and capabilities, determine a firm's profit [20]. The seminal work about strategic resources by Barney (1991) became the fundamental contribution to RBT, guiding the transformation perspective of the resource-based view into a developed theory as RBT. However, the traditional RBT does not elaborate on why and how some firms gain a competitive advantage in circumstances of unpredictable and rapid change [21]. The development of a broader RBT perspective suggests that firms can achieve competitive advantage not only by utilising critical assets, but also by building new potential capabilities via learning, skill acquisition and the accumulation of tangible and intangible assets over time. The resource-based logic suggests that if valuable resources (i.e. resources that are costly and difficult to imitate) are possessed by few firms, those firms that are able to control these resources has potential to generate sustained competitive advantage [17]. Hence, firms can achieve an advantage by continually recombining or reconfiguring diverse types of resources and by creating new applications to meet market demand like climate change management [16;18].

4. Research methodology

The population for this study comprise of all business Enterprises in the riverine areas of South-South region, which are mainly in Akwaibom State, Bayelsa, Delta, Cross river and Rivers State, Nigeria; and their various customers. However, since these are numerous and so cannot be determined in certainty; suitable sample was adopted as basis for study.

4.1. Sample Size and Sampling Techniques

Giving the situation of an infinite population or a very large population, the sample size was computed using the formula suggested by Cochran (1963) and Orji (2023) as below [18;22]:

$S=Z^2 (p) (1-p)/m^2$

Where:

S= sample size for infinite population

Z= z-score

P= population proportion
(assumed to be 50% = 0.5)

M= margin of error

Z score is determined based on confidence level. Confidence level is defined as the probability that the value of a parameter falls within a specified range of values. Considering a 95% confidence level then z-score is 1.96. Margin of error is a small amount that is allowed for in case of miscalculation or change in circumstances. Generally, the margin of error is considered as 5% (0.05) (Cochran, 1963)

Z score = 1.96

P= 0.5

M= 0.05

S= (1.96)2 (0.5) (1-0.5)/(0.05)2

S= 3.8416 0.25/0.0025 S= 384.16

= 385 respondents are needed

4.2. Methods of Data Analysis

The method of data analysis for the study is the is simple regression. The mathematical model is demonstrated as:

Y=A +Bxi + Bxii +Bx iii+ Bx iv+μ,

Climate change = Y(Constituents of Climate change)

A is the constant; B is the value of coefficient; μ is the error term.

Therefore, = (RSL) + (SMG) + (AIM) + (BP) + μ.

Where RSL= Rising sea level; SMG= Shrinking Mountain glaciers; AIM= Accelerating ice melting; BP= Business performance. Since, the aim of this study is to have sample drawn from both adult male, females, business owners from the region under study, judgmental/purposive sampling was applied. According to Orji (2017) Judgmental Sampling is applicable to situations in which the researcher is guided by the belief that reference subjects will provide the required data or information for a particular research process [23]. Thus, the study employed value judgment to select respondents from the population whose opinions will be relevant to make valuable decisions. A structured questionnaire which consists of closed-ended questions were used as instrument of data collection.

5. Results and Findings

Out of 384 questionnaires administered, 253 were returned valid. This represents 65.88% of the total number of questionnaires administered. Since this percentage is substantial enough, we can rely on it for analysis and probable outcome. Because according to Orji (2023) in social science research thirty percent of sample size is enough to form valid opinion [18].

First Hypothesis

H_{01}: Rising sea level does not have a significant effect on business performance in the riverine areas of South-South region of Nigeria'.

Table5. 1 discloses the outcome of the regression analysis. From the above table, the regression analysis between Rising sea level and business performance has a t-value of 39.428 with a corresponding probability value of 0.000. With the probability value of 0.000 which is less than the Standard Criterion (that is, 0.000 is less than 0.05), the study accepts the alternative hypothesis (H_1) indicating that the analysis is significant statistically. The study therefore concludes that Rising sea level has a significant effect on business performance in the riverine areas of South-South region of Nigeria.

Second Hypothesis

H_{02}: Shrinking mountain glacier does not have significant effect on business performance in the riverine areas of South-South region of Nigeria'

From Table 5.1 above, the regression analysis between Shrinking Mountain glacier and business performance has a t-value of 11.719 with a corresponding probability value of 0.038, which is less than the Standard Criterion (that is, 0.038 is less than 0.05), the study accepts the alternative hypothesis (H1) indicating that the analysis is significant statistically. The study therefore concludes that Shrinking Mountain glacier has significant effect on business performance in the riverine areas of South-South region of Nigeria.

Third Hypothesis

H_{03}: Accelerating ice melting does not have a significant effect on business performance in the riverine areas of South-South region of Nigeria'.

From Table5. 1 above, the regression analysis between accelerating ice melting and business performance has a t-value of 9.580 with a corresponding probability value of 0.045. With the probability value of 0.045 which is less than the Standard Criterion (that is, 0.045 is less than 0.05), the study accepts the alternative hypothesis (H_1) indicating that the analysis is significant statistically. The study therefore concludes that Accelerating ice melting does have a significant effect on business performance in the riverine areas of South-South region of Nigeria.

Table 5.1 Regression analysis

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.147	.155		-.949	.343
	Rising sea level.	.901	.023	.926	39.428	.000
	Shrinking mountain glacier	.034	.020	.040	11.719	.038
	Accelerating ice melting	.012	.020	.014	9.580	.045

a. Dependent Variable: Business Performance

6. Discussion of Findings

The study aim was to assess the influence of climate change on business performance in the South-South region of Nigeria. Specifically, the study evaluated the effect of Rising sea level, Shrinking Mountain glacier, and Accelerating ice melting on business performance. A total 253 respondents from South-South region of Nigeria participated in the survey and their opinion were collected using a structured questionnaire. The data obtained were analysed using descriptive and inferential statistics. The study showed that Rising sea level has a significant effect on business performance in the riverine areas of South-South region of Nigeria. This finding resonates with the findings of Almer et al (2017) who conducted a study on the effect of rising sea levels on performance of service firms in Egypt [24]. The study also found that Shrinking Mountain glacier have significant effect on business performance in the riverine areas of South-South region of Nigeria'. This corroborates the findings of Anderson et al (2018) that shrinking mountain glaciers has effect on the performance of SMEs in riverine area of China [5]. Finally, the study revealed that Accelerating ice melting does have a significant effect on business performance in the riverine areas of South-South region of Nigeria. This finding is in line with Arnell et al (2017) who did a study on impact of accelerating ice melting on selected companies in India [25].

7. Conclusion

This study has established that Rising sea level, Shrinking Mountain glacier, and Accelerating ice melting have effect on business performance in South-South region of Nigeria. Hence the study concludes that Climate change in one way or the other affects the businesses, economy and business environment. Mitigating climate change, addressing waste and pollution, and ensuring environmental sustainability are among the world's most pressing issues.

Based on the findings of the study, it is thus recommended that Nigerian government should pay serious attention to the high rise in sea level through different environmental policies and legislation; government should also encourage voluntary mitigation to reduce emission of greenhouse gases and shrinking mountain glaciers to protect the environment. Also, there is the need to for promoting businesses and environmental education; develop and put in practice adequate governance frameworks that enable the sharing and re-use of environmental data to recede or mitigate the effect of climate change in the riverine areas of Nigeria.

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