Manufacturing Practices and Sustainability Performance of Table Water Firms in Awka Metropolis

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Abstract:- Globally, manufacturing firms are constantly criticized for the manner in which they go about polluting the environment for the sake of developing products that satisfy the need of the consumers. In solving the above problem, this study was aimed at ascertaining the degree of association between product development and economic-environmental sustainability performance of table water firms in Awka. The population of this study is two hundred and sixty registered (260) table water firms in Awka. Out of the stated population, a sample size of 160 table water firms was derived using Taro Yamane's formula. In analyzing the generated data, mean and Pearson product moment correlation co-efficient were utilized. The study revealed that that Product development (PDV) has a significant positive relationship with Economic-environmental sustainability (EES) of table water firms in Awka. The study concluded that table water firms in Nigeria need to pay attention to environmental sustainability, which will to a great extent aid them in achieving and attaining competitive edge over noncompliance table water firms. it was recommended that Table water firms should try to develop sachets and plastic bottles that can easily fade overtime in order not to initiate artificial flooding. Finally, table water firms should work alongside small, medium and large-scale firms that are engaged in waste recycling process.

Keywords: Manufacturing, Susatainability Performance, Reliability

1. INTRODUCTION

With the growing global concerns on sustainability issues such as scarcity of natural resources, rapid environmental degradation, unequal balance of social equities and intense global competitions, sustainable manufacturing (SM) strategies have drawn attention (Norsiah, Mohd, & Zuhriah, 2015). As the concept of sustainability gains considerable influence over the nature of business activities, manufacturing firms encounter a pressing challenge on producing more products while using less resources as well as less pollution emitted and waste generated (Smith & Ball, 2012). Additionally, today's products are judged not just by output, but by the methods used to manufacture and transport them (Norani, Hasbullah, & Mohamad 2014). The recognition of the relationship between manufacturing processes and the natural environment has become an important factor in the decision making among manufacturing firms (Mbang, Ogbo, Emeh, Gabriel, Iheonkhan, & Afolabi, 2020).

The emergence of sustainable manufacturing practice (SMP) concept in manufacturing industry is the consequences of global development of sustainable practices, aimed at minimising the negative impacts of manufacturing activities to the environment (Mastura, Juhaini, Mohd & Murzidah , 2017).

Poor water supply in many developing countries, including Nigeria, had led to seeking for alternatives by residents (Bakker, Kooy, Shofiani & Martijn, 2008; Vedachalam, MacDonald, Omoluabi, OlaOlorun, Otupiri & Schwab, 2017). One of such alternatives is "table water" (an umbrella name for sachet, bottled and refill water) packaged in small sachets, disposable plastic bottles and large refillable containers (Vedachalam et al., 2017). Nigeria is one of the rapidly growing countries that intensely depend on table water majorly produced by profit-oriented enterprises to bridge the unmet need for drinking clean water in most parts of the country (Adekunle & Dakare, 2020). Ikon, Ohagim, Amadi, Abasioubong, Ekerenam, and Udoudo (2017) maintained that table water production and distribution in the Nigerian markets are seen as a less expensive means of accessing drinking water. As the production and consumption of table water are virtually seen everywhere in the country, it thus calls for the assessment of manufacturing activities such as product development, waste management, and logistic services that are environmentally, socially and economically sustainable.

In countries of the world, manufacturing sector is the leading sector that daily generates huge amount of waste which impact negatively on the environment through their unchecked practices.

In aiming to offset these adverse environmental challenges, many manufacturing firms now face significant challenges in achieving growth while at the same time addressing the environmental problems that result from their production processes which over the long term, create a sinkhole which might swallow up the manufacturing sector, economy and the environment (Mbang et al., 2017). Table water firms in Nigeria and Awka to be specific, are yet to pay attention to the development of product that both meets economic and environmental sustainability of the business. Table water firms in Awka have continuously failed to assess the environmental impact of their current product which most of the time is the key cause of flooding in the capital city during the rainy seasons as these used sachets and bottle water find their way to drainages thereby causing blockage. These blockages have to a large extent affected the inhabitants of the city's residents in ways that cannot be quantified, and thus these

unhealthy practices of developing economic product that is not environmentally friendly can no longer be ignored. With this however, there is need to undertake this study in order to find a lasting solution that curbs these unethical practices among table water firms in the capital city of Awka.

Broadly, this study is aimed at ascertaining the extent to which sustainable manufacturing practices affect sustainability performance of table water firms in Awka. More precisely, the study is aimed at achieving this singular objective;

1. To ascertain the degree of association between product development and economic-

2. REVIEW OF RELATED LITERATURE

2.1 Conceptual Review

Concepts relating to sustainable manufacturing practices (SMPs), firms' sustainability performance, and the state of practices among Nigerian table water firms were critically reviewed.

2.1.1 Concept of Sustainable Manufacturing Practices (SMPs)

There are large numbers of definitions on sustainability as proposed by different researchers and groups regarding their suitability and needs (Langston & Ding, 2004). However, the most agreed upon definition Comes from the Brundtland report of the World Commission on Environment and Development where Sustainability was defined to mean the intent of "meeting the needs of the present without compromising or endangering the ability of future generations to meet their own needs" (WCED, 1987, p. 43). For the purpose of this paper, our focus shall remain on sustainable manufacturing practices.

In earlier times, some scholars posit sustainable manufacturing (SM) to mean the production methods or technologies that simultaneously focus on economic development and environmental protection (Madu, 2001; Allwood, 2005). Most recently, the US Department of Commerce (2012) described sustainable manufacturing as the creation of manufactured products that involve nonpolluting processes, conserve energy and natural resources, and are economically sound and safe for employees, communities, and consumers. Additionally, SM expects firms to observe manufacturing activities that balances set requirements aimed at meeting the goals of sustainable development, (Soosay, Nunes, Benneth, Sohal, Jabar & Winroth, 2016). Furthermore, SM has proved to be a viable means which improves business competitiveness over a stipulated period (Vinodh & Joy, 2012).

The evolution of sustainability and sustainable manufacturing concepts gave rise to series of sustainable manufacturing practices; from the application of technology for the treatment of pollution at the end of the pipe to complex integrated systems of production which support collaboration across functional areas within a firm as well as inter-organizational levels such as closed-loop production and industrial symbiosis (Organisation for Economic Co-operation and Development, 2010). Considering the evolution of SM, SMP can be defined as a firm's intra- and inter-organizational practices that integrate environmental, economic and social aspects into operational and business activities (Norsiah, Mohd, & Zuhriah, 2015). Differentiating based on the orientation of sustainable thinking, SMP can be categorised into internal SMP and external SMP. While internal SMP focuses on sustainable practices within a firm, external SMP relates to the inter-organisational practices within the value system and beyond the chain of production to improve economic, environmental and social sustainability simultaneously (Norsiah, Mohd, & Zuhriah, 2015). Based on global current needs, SMP implementation gives many benefits to countries ranging from social, economic, and environmental aspect (Anis, Nurul, Juriah, Nurzatul, & Suzaituladwini, 2012). Some of the strongest sustainability decision drivers reported in Fairfield, Harmon and Behson (2011) study include: spurring innovation and growth, enhancing reputation and image, avoiding regulatory entanglements, and attracting and retaining top talent - are those often identified as among the strongest corporate benefits of sustainability strategies (Savitz and Weber, 2006).

Generally, the development of SMP can be observed at the three levels that include: product, process and system (Jayal, Bardurdeen & Jawahir, 2010).

At the product level, the traditional 3R concepts which are: reduce, reuse, and recycle has been transformed to a more sustainable 6R approach which are: reduce, reuse, recycle, recover, redesign, and remanufacture; thereby changing the paradigm from single life cycle to multiple life cycles (Jayal, Bardurdeen & Jawahir, 2010).

2.1.2 Firms' Performance Sustainability

Organizational performance reflects the ability of an organization to fulfill its shareholders' desires and survive in the market (Griffin, 2003). Similarly, organizational performance is known as the outcome of the actions or activities, which organizational members carry out in measuring organizational success towards goal attainment (Chung, & Lo, 2007; Ho, 2008). Organizational performance according to Cho and Dansereau (2010) refers to the performance of a company as compared to its goals and objectives. In addition, Tomal and Jones (2015) define organizational performance as the actual results or output of an organization as measured against that organization's intended outputs.

Sustainability performance (SP) can be defined as the performance of an organisation in all dimensions and for all drivers of corporate sustainability (Schaltegger & Wagner, 2006, p.2). Sustainability manufacturing extends beyond the boundaries of a single company and typically addresses the performance of both upstream suppliers and downstream customers in the value chain (Fiksel, McDaniel & Mendenhall, 1999). It deals with the social, environmental and economic aspects of the organisations in general, and of corporate sustainability performance in particular (Epstein, 2008). Sustainability performance reflects one target end of the move of companies in the corporate responsibilities' continuum (Schaltegger & Wagner, 2006) from corporate conformance, certifying, compliance and reporting with given standards to corporate performance in relation to stakeholder expectations (Epstein, 2008).

To further this study, the sub-variable of sustainable manufacturing practices which is product development will be discussed alongside the selected constituent of performance sustainability which are economic and environmental performance sustainability.

2.1.3   The Impact of Sustainable Product Development on Economic and Environmental Performance Sustainability

Organisational survival over-time depends on the ability to create loyal customers because its products constantly meet the needs of the buyers (Gladson, Elizabeth & Joyce, 2009). For a firm to compete effectively in the dynamic and competitive business environment and achieve set goals in terms of profitability, high sales volume, and large market share, it must continuously develop products and product lines that constantly satisfy the changing desires and needs of customers (Grundiche, 2004). Product development (PD) is a broad field of endeavour dealing with design, creation and marketing of new product, (Yanelle, 2005). PD encompasses product planning as well the technical activities of product research, engineering design, etc to take advantage of potential opportunities facing a company's product idea in a market (Gladson, Elizabeth & Joyce, 2009).

The development of product should not be the fore-most endeavour among organisations, but the need to pay keen attention to the manufacturing of sustainable products that not only meets the need of the current market, but also weighs its economic impact in an environment. In other words, in developing products, there is need to employ strategies that are long term focused rather than short term (Ferro, Padin, Svensson, Carlos, Varela & Wagner, 2017). Additionally, in the early stage of sustainable product development, the type of material used in a new product must meet interested parties and stakeholder requirements.

Sustainable product development (SPD) refers to the preservation and maintenance of practices that ensures continuous quality of product (Mohd, Rosman, Rohaizah & Mohd, 2018). An important part of sustainable product development criteria is economic matter of the organisation that plays a critical role in terms of optimum cost incurred while developing new products (Mohd, Rosman, Rohaizah & Mohd, 2018). Hence, primarily concept of economic matters rests on the coordination of activities within and between the organisations during the development of new product that includes the process of design, assembly and after sales service of new product development (Mohd & Rushami, 2014). In ensuring sustainable product development, organisations are expected to adopt sustainability elements in the development of new product that consists of economy, environment and social (Abdul, Sakundarini, Raja & Thurasamy, 2017). These elements are also known as the three pillars of product development (Elkington, 1997)

Economic environmental sustainability pertains to product development that minimizes the cost involved in product development without compromising the quality of the product (Mohd, Rosman, Rohaizah & Mohd, 2018). Also, the economic value of waste management relating to product development needs to be paid close attention to in order to ensure that the new product meets regulatory and statutory requirements (Mohd, Rosman, Rohaizah & Mohd, 2018). Aparna and Seema (2020) identified the key performance indicators to include: Initial cost, Operation cost, Maintenance cost, Renovation cost, Cover against, environmental risks, Adaptability to utilisation change, Early project planning, Fire prevention, Marketability, Provision of local, employment, Construction time, Price for sale or rental, Return on investment

Environmental performance sustainability relates to the consequence of product development on the environment. Organisations need to pay close attention on how they follow strictly, government and societal related environmental regulation aimed at improving organizational environmental situation that is associated with human sciences of life (Raitu & Anderson, 2015).

To achieve environmental sanitation target, the environmental criteria for new product development must consider controlling at optimum level solid waste used in the new product development and manufacturing process that can decrease the consumption of any toxic material (Mohd, Rosman, Rohaizah & Mohd, 2018). For Townsend (2008), environmental sustainability focuses on the quality and quantity of natural resources, the environment, global warming, ecological concerns, waste management, reductions in energy and resource use, alternative energy production, and improved pollution and emissions management. Manufacturing practices therefore should result in minimum waste and energy usage in order to avoid regulatory entanglements (Gunasekaran and Spalanzani, 2012).

2.1.4   The state of practices among Nigerian table water firms

The Nigerian table water industry is an important and vital sector in the Nigerian economy (Adekunle & Dakare, 2020). From an economic viewpoint, the contributions of the table water industry to the Nigerian economy include but not limited to: providing more access to safe, adequate, improved and affordable drinking water; engaging both male and female members of the society; employment of young and old members of the society; income generation for owners and government; as well as reduction of crime and other social vices as a result of implementation in employment and income generation (Ikpe, 2014; Omole, Ndambuki & Balogun, 2015; 2015; Bello, Shuangqin & Dalibi,2017; Adekunle & Dakare, 2020).

In Nigeria, the National Agency for Food and Drug Administration Control (NAFDAC) is the sole regulator established and empowered to enforce compliance with the drinking water qualities guideline values as recommended by the World Health Organization (WHO, 1996). All packaged water are mandated to undergo rigorous scrutiny by NAFDAC which results to certification and allocation of approval number (Dada, 2009). It is believed that before issuance of operational number, firms must have satisfied all the necessary conditions for operating sustainably as stipulated by the Agency (Adekunle & Dakare, 2020).

2.2   Theoretical Framework

To theoretically anchor this study on a known management and organisational theory, this study on sustainable manufacturing practices shall be anchored on institutional theory. Institutional theory is traditionally concerned with how groups and

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organisations safely secure their positions and legitimacy by conforming to the rules and norms of the institutional environment (Maggio & Powell, 1983). Based on the Institutional theory, external social, political, and economic pressures influence firms′ strategies and organizational decisions as firms seek to adopt legitimate practices in the view of their stakeholders (Jennings & Zandbergen, 1995). Institutional theory provides a theoretical lens through which manufacturing firms can adopt practices that promote the future of the sector, including factors such as culture, social environment, legal as well as economic environments (Mbang, Ogbo, Emeh, Gabriel, Iheonkhan, Afolabi, 2020). Once Institutional philosophy becomes dominant, it affects the decision of firms by focusing the attention of executives towards the set of challenges and solutions that are consistent with the dominant philosophy and away from those challenges and solutions that are not (Mbang, Ogbo, Emeh, Gabriel, Iheonkhan, Afolabi, 2020). Therefore, institutions can define what is appropriate or legitimate and what acceptable behaviour is and thus render other actions unacceptable or even beyond consideration (Maggio & Powell, 1983).

2.3   Empirical Review

Adekunle and Dakare (2020) empirically examined and investigated the relationship between sustainable manufacturing practices (SMPs) and performance of table water industry (TWI) in Nigeria. A Cross-sectional survey research design was adopted for the study. The population of the study covers all the registered table water firms in Delta and Edo states by National Agency for Food and Drug Administration and Control (NAFDAC). Data collected through questionnaire administration were analyzed using descriptive statistics. Structural equation modeling (SEM) was used in estimating the research models. The study found that SMPs are adopted by table water firms registered by NAFDAC. It was also found that sustainable packaging and waste management significantly influence the different dimensions of sustainable performance of table water firms. The study recommends that table water producers should ensure they consistently adhere to NAFDAC standards after product registration and certification to make the products safe for consumption. Also, NAFDAC should promote a regulatory environment with appropriate incentives to table water firms that consistently comply with stipulated regulations that can promote the sustainability of the environment while any table water firms found engaging in unwholesome activities that can undermine the health status of consumers should be severely sanctioned.

Yousif, Norsiah, and Susan (2020) investigate about the extent of SMPs and SP to encourage the oil and gas industry (O and GI) in the context of Iraq to obtain a balance in the dimensions of SP. In executing the study, data were collected from 80 companies were analysed using descriptive statistics method by using SPSS version 25. The results revealed that the extent of the four SMPs and the three dimensions of SP which includes environmental sustainability (EnS), social sustainability (SoS) and economic sustainability (EcS) in companies were implemented at a slight level. These results imply that although SMPs have become a required necessity expected from all industries, and companies should prefer to implement them, there is still needed to more efforts in implementation of SMPs among the O and GI to achieve a balance in the dimensions of SP.

Mbang, Ogbo, Emeh, Gabriel, Iheonkhan, and Afolabi (2020) utilised trend analysis in assessing the impact of carbon emission, greenhouse gas, nitrogen oxide and methane emission emitted by firms on the ecosystem in Nigeria, and the value added by the manufacturing sector thereof. Data were sourced from the World Development Indicators and it was concluded that green manufacturing is a necessary practice to stem the tide and make the environment a living place for both animals and humans. It is recommended from the findings that; there should be harmonized global environmental framework, which will serve as benchmark for global reporting on the effect of manufacturing activities on the ecosystem.

David, Lokman, John, Lanita, and George (2012) investigate the relationship between organisations' sustainability performance management practices and sustainability performance. Data for the study were collected from 314 medium to large organisations operating in Australia. A mailed printed questionnaire was used to collect the data. Personal interviews with 20 senior executives were conducted to pilot test and refine the questionnaire. The results indicate the organisations apply eight sustainability performance management practices (SPMPs) to improve seven different sustainability performance indicators (SPIs). Each of the eight SPMPs is positively associated with at least one or more SPIs. The paper finds that customer value, new product development and information capital performance indicators are each associated with a single SPMP, while the other four performance indicators (environmental, employee value, social responsibility, and financial performance) are each associated with multiple SPMPs. Overall, the results indicate that increasing the level of an organisation's focus on its individual SPMPs is positively associated with its better performance under one or more SPIs.

Mohd, Rosman, Rohaizah & Mohd (2018) aimed at addressing the relationship between the criteria of sustainable product development and the effect on an organizational performance. The outcome of the study contributed to the enhancement of criteria for sustainable product development in the automotive industry and other related industries. The causal relationship approach was adopted in the study by using random sampling among the 273 automotive suppliers in Malaysia. The analysis result using PLS SEM reveals that the criteria of sustainable product development that consists of economy, social and environment are contributing to significant positive effect on the organizational performance in automotive industry.

Gladson, Elizabeth & Joyce (2009) examined product development and corporate performance in the Nigerian brewing industry. Data were gathered from 32 officials drawn from marketing, R&D and production departments in four breweries in the south-south and south east geographical regions of Nigeria through the use of questionnaire. The data were analyzed using appropriate statistical tool (spearman rank order correlation co-efficient). The data revealed among other things that product development

facets of product quality and product lines/product mix were positively and significantly correlated with the corporate performance facets of profitability, sales volume and customer loyalty. The study also revealed that the relationship between product size, product design and profitability, sales volume and customer loyalty was not significant. The study concludes that a positive and significant relationship exists between product quality product lines/product mix and profitability, sales volume and customer loyalty. To this end, it was recommended among other things that high product quality should be maintained and that the breweries should continuously develop new market segments and develop appropriate product accordingly.

From the review of related literature, it was observed that only a single work (Adekunle and Dakare, 2020) has been done to address sustainable manufacturing practices among table water firm in Nigeria. The researcher focused on Edo and Delta state thereby paving way for a replicative study to be carried out in other parts of the country. To this end therefore, this study intends to fill the research gap that exists in Anambra state, Awka to be precise where there has been no known study aimed to address the issue of sustainable manufacturing practices among table water firms.

3.   METHODOLOGY

3.1   Research Design
A descriptive survey research design was adopted in this study; the reason for adopting the descriptive survey research design was because the study intended to collect data directly from respondents of the study. Descriptive survey research design was considered appropriate because it permits the study involve the respondents through the use of questionnaire as data was collected directly from the respondents of the study.

3.2   Population of the Study
The population of this study is two hundred and sixty registered (260) table water firms in Awka. This figure was made available to the researcher by a staff in the state's internally generated revenue house.

3.3   Sample Size Determination and Sampling Technique

The sample size was determined using Taro Yamane formula:

$$n = \frac{N}{1 + Ne^2}$$

Where:

N = population size

n = sample size

$$n = \frac{260}{1.6} = 160$$

Therefore, the sample size is 160 table water firms.

The study adopted Random Sampling Technique because the study intended to give equal chance to every member of the population to be in the sample. Therefore, simple random sampling technique was considered appropriate for the study.

Table 3.1   Reliability Test Table

OPTION	NO OF DISTRIBUTION	PRE-TEST	RETEST	DIFFERENCE	D^2
Strongly Agree	40	38	29	9	81
Agree	40	39	26	13	169
Undecided	40	12	11	1	1
Disagree	40	11	10	1	1
Strongly Disagree	40	11	12	-1	1
Total					253

Source: Field Survey, 2021.

$Formula \ 1 - \dfrac{6 \, Edi^2}{n(n^2 - 2)}$

d   =   deviation/differences
n   =   number of paired items
1   =   unity
Substitute

$$r = \frac{1 - 6x253}{40 \,(40^2 - 1)}$$
$$r = 0.82$$

4. DATA PRESENTATION, ANALYSIS, AND DISSCUSION OF FINDINGS

4.1 Response Return Rate

The one hundred and sixty administered copies of questionnaire were filled and duly returned with none being invalid. This therefore implies a 100% success rate in the process.

4.2 Descriptive Statistics

The table below shows the mean rating of the responses of the respondents. The mean was computed using weighted mean approach. It can be used to answer item questions.

Table 4.1: Item Statistics

	Mean	Std. Deviation	N
PDV1	4.6125	.48871	160
PDV2	4.6125	.48871	160
PDV3	4.2000	.64232	160
PDV4	4.6375	.48223	160
PDV5	4.6375	.48223	160
EES1	4.6125	.48871	160
EES2	4.6375	.48223	160
EES3	4.2375	.65864	160
EES4	4.2500	.66351	160
EES5	4.6125	.48871	160

The questionnaire items labeled PDV1 – PDV5 and EES1 – EES5 shows the summation scale used in measuring product development and economic-environmental sustainability. It can be deduced from the table that the mean of the items ranged from 4.2000 to 4.6375 which implies that they are fit to be used in running test of correlation.

4.3 Hypothesis Testing

The study hypothesis is; H_0: there is no positive association between product development and economic-environmental sustainability performance of table water firms in Awka. Using Pearson product moment correlation co-efficient using 5% level of significance, the result is thus;

Table 4.2: Correlations

		PDV	EES
PDV	Pearson Correlation	1	.596
	Sig. (2-tailed)		.029
	N	5	5
EES	Pearson Correlation	.596	1
	Sig. (2-tailed)	.029	
	N	5	5

Recall our decision rule which states that we accept the Alternate hypothesis (H_a) if P-value is less than 0.05 (P-value < 0.05); otherwise accept the Null hypothesis (H_o).

From the obtained result, the P-value of 0.029 is less than 0.05 which is highly significant, we therefore accept the alternate hypothesis. Hence, it can be concluded that Product development (PDV) has a significant positive relationship with Economic-environmental sustainability (EES) of table water firms in Awka.
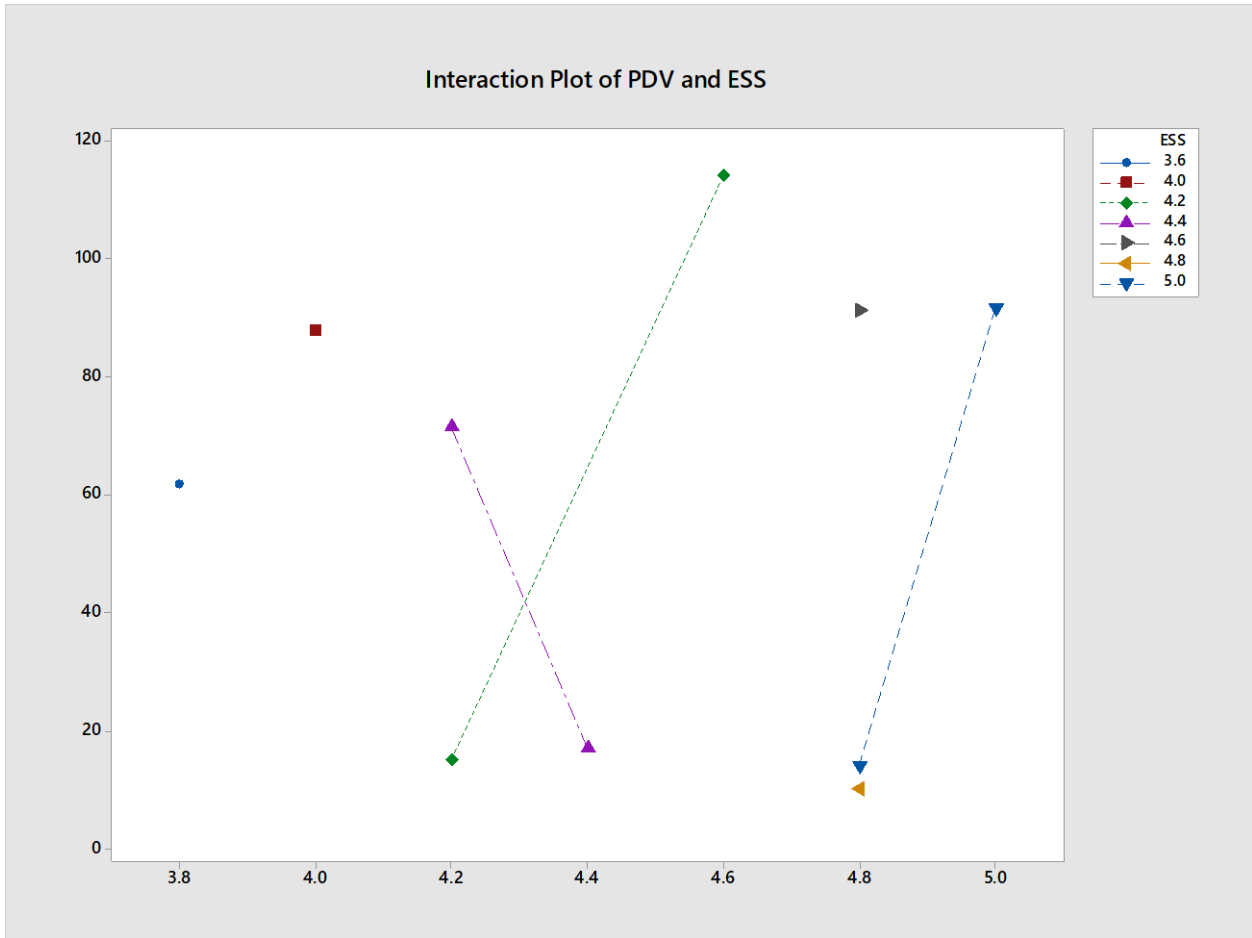
Figure 4.1: Interaction Plot of PDV and ESS

From the interaction plot analysis of PDV and ESS, it can be deduced that an interaction exists between the two variables, therefore the responses gotten from survey are quite reliable.
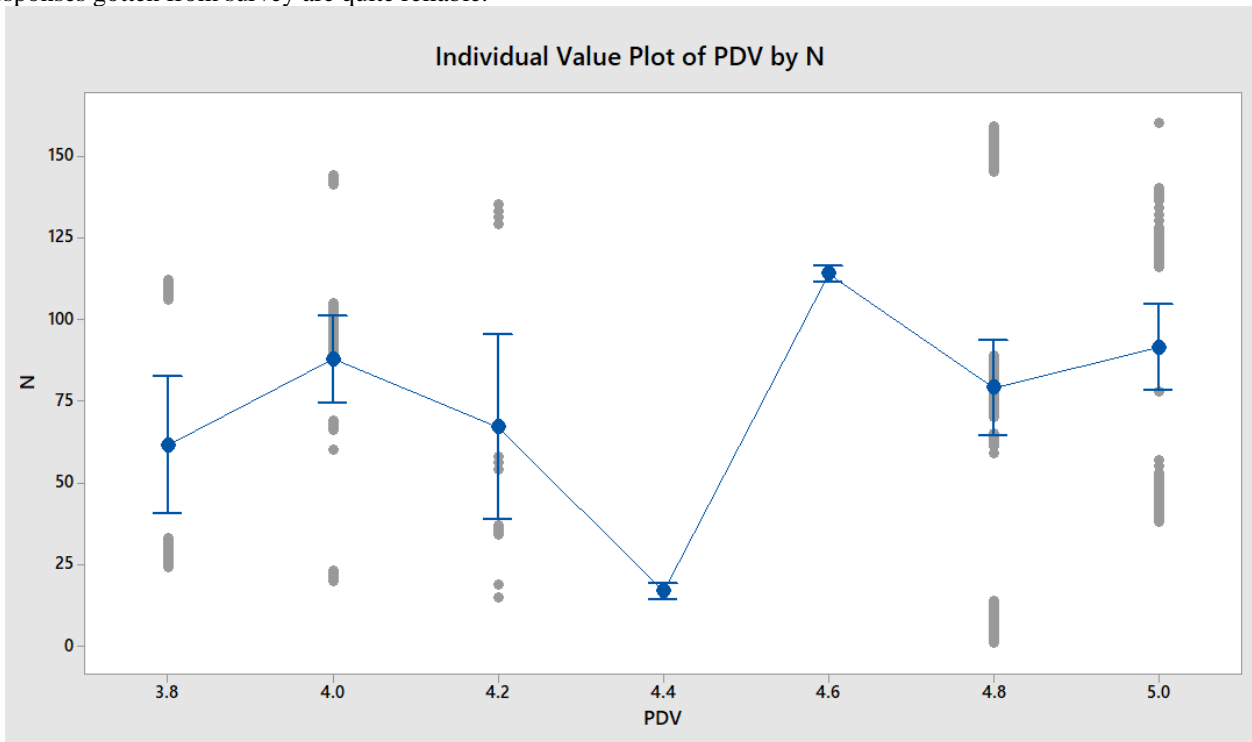

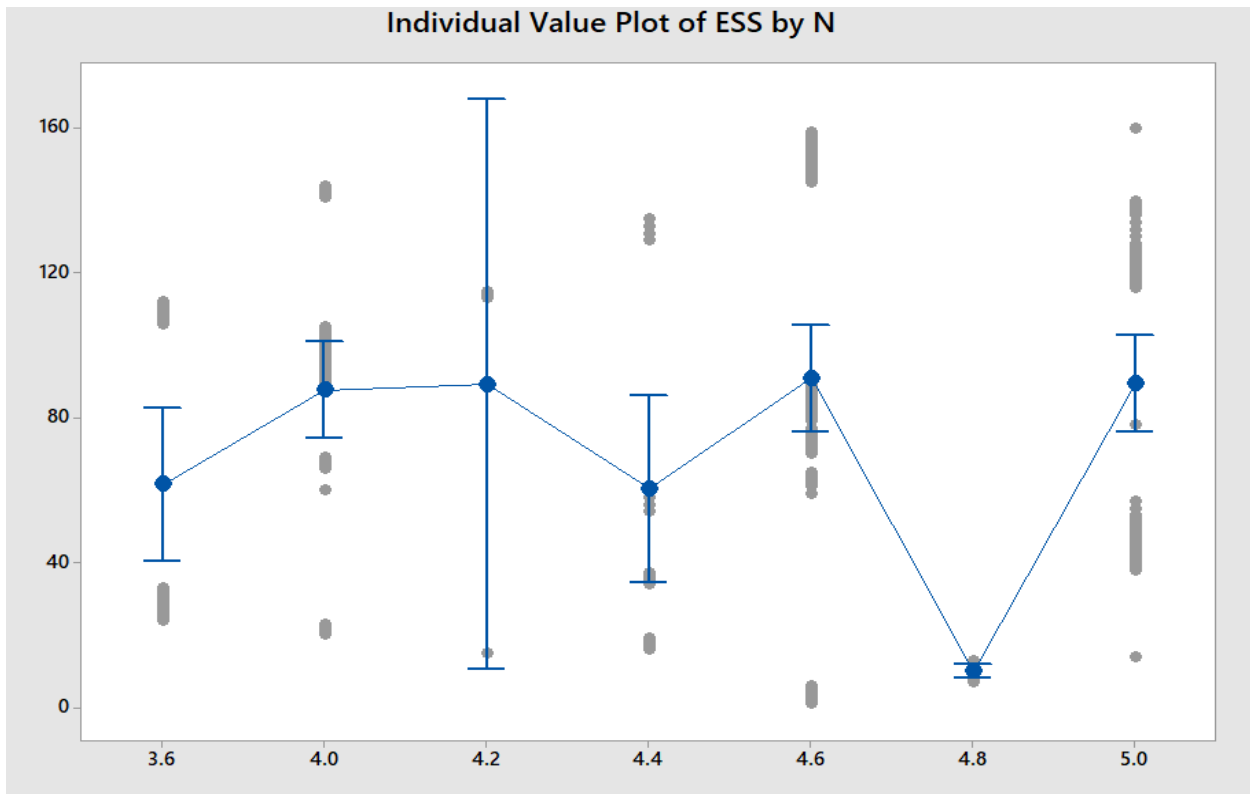Figure 4.2: Individual value plot of PDV by sample size

Figure 4.3: Individual value plot of ESS by sample size

At 95% confidence level, the individual plots analysis for the variables as presented in figures 3 and 4 show that there are no outliers from the data collected.

4.4 Discussion of finding

Having been able to establish that there is a positive association between Product development (PDV) and Economic-environmental sustainability (EES) of table water firms in Awka. There is need for this work if available to agree with other studies. The finding of this study finds a good cushion with that of Adekunle and Dakare (2020), when found that sustainable packaging and proper waste management technique significantly impact on the different dimensions of sustainable performance of table water firms. Additionally, the finding of this study agrees with the work of Mohd, Rosman, Rohaizah & Mohd (2018), when they affirm that sustainable product development which consists of economy, social and environment positively contributes on the organizational performance in automotive industry. Finally, this study disagrees with the work of Gladson, Elizabeth & Joyce (2009) when they assert that the relationship between product size, product design and profitability, sales volume and customer loyalty was not significant.

5. CONCLUSION AND RECOMMENDATION

Ascertaining the extent to which product development impacts on economic-environmental sustainability has been the focus of this study. The study has established the fact that table water firms and other manufacturers in general do not need to pay attention to only the economic aspect of their business but also assess the impact the residual of their product have on their immediate environment. Once table water firms not just in Awka but all other states in Nigeria pay attention to this environmental sustainability, they will to a large extent be able to achieve and attain competitive edge over non compliance table water firms since their immediate environment are happy with their social responsiveness.

From the findings made in this study, the following recommendations are made:

1. Table water firms should try to develop sachets and plastic bottles that can easily fade overtime in order not to initiate artificial flooding.
2. Also, table water firms as a matter of importance should work alongside recyclers in different area of Anambra state, most especially in Awada Onitsha where a good number of recyclers operate on different scale (small, medium, and large).

REFERENCES

[1] Abdul, S. H., Sakundarini, N., Raja Ghazila, R. A., & Thurasamy, R. (2017). The impact of sustainable manufacturing practices on sustainability performance. *International Journal of Operations & Productions Management, 37*(2), 182-204

[2] Allwood ,J. (2005). What is sustainable manufacturing? Sustainability: What are the issues? In: Sustainable Manufacturing Seminar Series; February.

[3] Aparna., N & Seema K. (2020). Key performance indicators of sustainability. 5th International Conference on modeling and simulation in civil engineering. IOP Conf. Series: Earth and Environmental Science 491.

[4]   Bakker, K., Kooy, M., Shofiani, N.E. & Martijn, E.J. (2008). "Governance failure: rethinking the institutional dimensions of urban water supply to poor households", *World Development*, 36(10): 1891-1915.

[5]   Bello, B.S., Shuangqin, L. & Dalibi, S.G. (2017), "Social impacts of packaged and bottled water businesses in Nigeria", *International Journal of Economics, Commerce and Management*, 5(6): 590-603.

[6]   Cho, J. & Dansereau, F. (2010), "Are transformational leaders fair? A multi-level study of transformational leadership, justice perceptions, and organizational citizenship behaviors", *The Leadership Quarterly*, 21(3) : 409-421

[7]   Chung, R. G. & Lo, C. L. (2007). The relationship between leadership behavior and organizational performance in non-profit organizations, using social welfare charity foundations as an example. *Journal of American Academy of Business,Cambridge*, *12(1)*

[8]   Dada. C. (2009). Towards a successful packaged water regulation in Nigeria. *Scientific Research and Essay*. 4 (9): 921-928.

[9]   David, G., Lokman, M., John, S., Lanita, W. & George, H. (2012). The influence of sustainability performance management practices on organisational sustainability performance. Journal of Accounting & Organizational Change. 8(2) : 210-235.

[10] DiMaggio, P. J. & Powell, W. W. (1983). "The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational Fields," *American Sociological Review*, vol. 48, (2): 147–160.

[11] Elkington, J. (1997). *The triple bottom line of 21st century business cannibals with forks* (April).

[12] Epstein, M. J. (2008). *Making Sustainability Work: Best practices in managing and measuring social and environmental impacts,* Greenleaf, Sheffield

[13] Fairfield, K., Harmon, J., & Behson, S. (2011). Influences of the Organizational Implementation of Sustainability: An Integrative Model. *Organization Management Journal,* 1541-6518.

[14] Ferro, C., Padin, C., Svensson, G., Carlos, J., Varela, S., & Wagner, B. (2017). Validating a framework of stakeholder in connection to business sustainability efforts in supply chains. *Journal of Business & Industrial Marketing, 32*(1), 124-137

[15] Fiksel, J., McDaniel, J. & Mendenhall, C. (1999) Measuring Progress Towards Sustainability: Principles, process, and best practices, *Greening of Industry Network Conference; Best Practice Proceedings*, Battelle Memorial Institute, Life Cycle Management Group Columbus, Ohio.

[16] Gladson, N., Elizabeth & Joyce, O. (2009). Product development and organizational performance. *African Journal of Marketing Management*. Vol. 1(3) : 089-101

[17] Griffin, K. (2003). Economic globalization and institutions of global governance. *Development and Change*, *34(5)*: 789–807.

[18] Grundiche, Y. (2004). *Marketing Strategy and Plans: Organizational Perspectives,* 2nd Ed., Chicago. The Dryden Press p. 168.

[19] Gunasekaran, A. and Spalanzani, A. (2012), "Sustainability of manufacturing and services. Vol. 140(1): 35-47

[20] Ho, L. A. (2008). What affects organizational performance? The linking of learning and knowledge management. *Industrial Management & Data Systems*, *108(9)*(1234–1254).

[21] Ikon, G.M., Ohagim, P.I., Amadi, C.P., Abasioubong, V.N., Ekerenam, E.U. & Udoudo, E.M. (2017), "Quality assessment of selected sachet water sold in Uyo metropolis, Nigeria", *World Journal of Pharmaceutical Research*, Vol. 6 No. 8, pp. 86-95.

[22] investigations for research and applications", *International Journal of Production Economics*,

[23] Jayal, A. D, Badurdeen, F. Jr. OWD., & Jawahir, I. S (2010). Sustainable manufacturing: Modeling and optimization challenges at the product, process and system levels. *CIRP Journal of Manufacturing Science and Technology,* 2(3):144-152.

[24] Jennings, P. & Zandbergen, P. (1995). Ecological sustainable organisations: An institutional approach, *Academy of Management Review*.

[25] Langston, C. A. & Ding, G. K. C. (2004). *Sustainable Practices in the Built Environment*, 2nd ed. Oxford: Butterworth-Heinemann.

[26] Madu, C. N. (2001). *Handbook of environmentally conscious manufacturing*. Massachusetts, US: Kluwer Academic Publishers.

[27] Mastura, R., Juhaini, J., Mohd, R., & Murzidah , M.(2017). Sustainable manufacturing drivers and firm performance: moderating effect of firm size. *International Journal of Advanced and Applied Sciences,* 4(12): 243-249.

[28] Mbang, B.,Ogbo, A., Emeh, C., Gabriel, O., Iheonkhan, I., & Afolabi, A .(2020).Green Manufacturing: Rethinking The Sustainability of Nigerian Manufacturing Firms. *International Journal of Management.* 11(12): 132 – 142

[29] Mohd Akhir, A. & Rushami, Z. Y. (2014). *The mediating effect of sustainable product development on the relationship between quality management practices and organizational performance: A study in Malaysian automotive industry*. Unpublished PhD Thesis

[30] Mohd, A., Rosman, A., Rohaizah, S., & Mohd, K. (2018). The Criteria of Sustainable Product Development and Organizational Performance. *International Journal of Supply Chain Management.* 7(5).

[31] Norani, N., Hasbullah, A. & Mohamad, F. (2014). A Case Study of Sustainable Manufacturing Practices. *Journal of Advanced Management Science. 2(1)*

[32] Norsiah, H., Mohd, R., and Zuhriah, E. (2015). The Impact of Sustainable Manufacturing Practices and Innovation Performance on Economic Sustainability. 12th Global Conference on Sustainable Manufacturing. *Procedia CIRP* 26: 190 – 195.

[33] OECD (2010). Eco-innovation in industry: Enabling green growth, OECD Publishing.

[34] Omole, D.O., Ndambuki, J.M. and Balogun, K. (2015), "Consumption of sachet water in Nigeria: quality, public health and economic perspectives", *African Journal of Science, Technology, Innovation and Development,* 7(1)1 : 45-51.

[35] Raitu, C., & Anderson, B. B. (2015). The multiple identities of sustainability. *World Journal of Science, Technology and Sustainable Development, 12*(3), 194-205

[36] Schaltegger, S. & Wagner, M. (2006) 'Integrative management of sustainability performance, measurement and reporting', *Int. J. Accounting, Auditing and Performance Evaluation*, 3(1) : 1–19

[37] Smith L, Ball P. Steps towards sustainable manufacturing through modelling material, energy and waste flows. *International Journal of Production Economics*, 140: 227-238.

[38] Soosay. C., Nunes, B., Bennett, D.J., Sohal, A.S., Jabar, J., & Winroth, M. (2016). Strategies for sustaining manufacturing competitiveness: Comparative case studies in Australia and Sweden. *Journal of Manufacturing Technology Management*, 27(1): 6-37.

[39] Tomal, D.R. & Jones, K.J. (2015), "A comparison of core competencies of women and men leaders in the manufacturing industry", *The Coastal Business Journal*. 14(1): 13-25.

[40] Townsend, C.R. (2008), *Ecological Applications: Towards a Sustainable World*, Blackwell, Oxford.

[41] US Department of Commerce.(2012). Promoting competitiveness: Partnerships and progress of the office of manufacturing and services. *International Trade Administration*.

[42] Vedachalam, S., MacDonald, L.H., Omoluabi, E., OlaOlorun, F., Otupiri, E. & Schwab, K.J. (2017),"The role of packaged water in meeting global targets on improved water access", *Journal of Water, Sanitation and Hygiene for Development,* Vols 1-9, washdev2017155.

[43] Vinodh, S. and Joy, D. (2012). Structural equation modeling of sustainable manufacturing practices. *Clean Technologies and Environmental Policy*, 14(1): 79-84.

[44] World commission on environment and development (WCED*) (*1987*). Our Common Future*, Oxford and New York: Oxford University Press.

[45] Yannele, W. T. (2005). *Marketing: Theory, Principles and Practice*, London, Macmillan Books Ltd. p. 92.

[46] Yousif, M., Norsiah,H., & Susan, S. (2020). Assessing Sustainable Manufacturing Practices and Sustainability Performance Among Oil and Gas Industry in Iraq. *International Journal of Energy Economics and Policy*, 10(4), 60-67.