



2021 INTERNATIONAL CONFERENCE ON ACCOUNTING AND FINANCE (ICAF)

ACCOUNTING AND FINANCE PROGRAMME COLLEGE OF MANAGEMENT AND SOCIAL SCIENCES (COMSS) BOWEN UNIVERSITY, IWO, OSUN STATE, NIGERIA

29 NOVEMBER – 1 DECEMBER 2021

# THEME

ACCOUNTING AND FINANCE PROFESSION – FOSTERING SUSTAINABILITY INITIATIVES PUBLISHED IN THE INTERNATIONAL CONFERENCE ON ACCOUNTING AND FINANCE PROCEEDING (ISSN: 2814-0257)

VOLUME 2

#### PRODUCT DESIGN AND NIGERIAN ANKARA FABRIC: A VILE FOR SUSTAINABILITY INITIATIVES IN AFRICA

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#### ABSTRACT

This study focused on product design and customer patronage of Nigerian Ankara fabric: a vile for sustainability initiatives in Africa. The specific objectives were to examine the effect of quality graphic design and colour as metrics of Product Design on Nigerian Ankara Fabric product towards sustainability initiatives in Africa. The study utilized survey research design. Survey Primary source was used to enrich this study to proof its originality. The population of the study comprised of user of Akanra fabric in Ado-Ekiti Metropolis, Nigeria. The study utilized convenience sampling technique to drawn sample of 235 for the study. This sampling technique was used to administered guestionnaire to available persons in the various concerned units among selected respondents. 5-point Likert scale options of structured questionnaire were used in the study to obtain respondents response. Content validity was used to determine the validity of the instrument and the value of the test of reliability was 0.87 which was calculated using test-retest reliability method. Data were analyzed and tested using Simple linear regression. The findings revealed that quality graphic design and colour as metrics of product design have significant effect on Nigerian Ankara Fabric product towards sustainability initiatives in Africa. The study attracts the following recommendations as follows: Manufacturing company's manager should establish a design that can entice the society to patronize their Ankara fabric product, Manager should involve in proper planning of effective design that persuade customers to purchase their product, and Manufacturing activities should imbibe good graphic design and colour in order to polish the image of their product.

Keywords: Product design, Ankara fabric, Sustainability, Initiative, Nigeria

#### INTRODUCTION

Nigeria textile manufacturing industry has great opportunity in the world market if they imbibe in guality and beautiful product design to entice the users across the globe which in turn enhances sustainability initiatives in the Nation. In every country, most people compete in fashion of various styles to measure up with higher class in the society. A well attributed design Ankara fabric of various forms motivates lover of Fashion across the world to look unto Nigeria to display their various styles. Product design plays a vital role in textile industry offering, Kreuzbauer and Malter as cited in Ravasi and Stigliani (2012). Showed how subtle changes in product design elements could induce different perceptions of a product's uses and category membership. He further suggested that taste is cultivated, and that the development of "design connoisseurship" requires education and exposure to beautiful things (Osborne as cited in Ravasi & Stigliani 2012).

Veryzer and Hutchinson as cited in Ravasi and Stigliani (2012) observed that, product designs that are highly unified and prototypical are most liked by consumers (also see in Carson, Jewell, and Joiner, 2007). Cox and Cox (2002) also stated that preferences for visually complex product designs tend to increase with repeated exposure. More recently, Kumar and Garg (2010) show how consumers prefer designs that balance the levels of attention resources needed and pleasantness in visually evaluating the design. Landwehr, McGill, and Herrman, (2011) posit that products' "facial" expressions can influence consumers' liking by triggering pleasure and arousal.

#### STATEMENT OF THE PROBLEM

Product design is very significant in enhancing Nigerian textile product such as Ankara fabric which can boost economic development, but Nigeria government pay less attention to this segment of industry due to dependent on

petroleum as their major sources of revenue in the country. The manufacturing sector was ignored by the government in preference for easy money from petroleum resources. Scholars including Ojameruaye (2004), Fardmanesh as cited in Murtala , Ramatu, Yusuf & Gold (2018), Ezeala and Harrison, and Davis as cited in Murtala , Ramatu, Yusuf & Gold (2018), Ezeala and Harrison, and Davis as cited in Murtala , Ramatu, Yusuf & Gold (2018), Ezeala and Harrison, and Davis as cited in Murtala , Ramatu, Yusuf & Gold (2018) argued that the best possible explanation for the neglect of the manufacturing sector was the deindustrialization process. The outcompeted sectors include textile, rubber, cocoa, and other manufacturing industries. Ilegbinosa, Uzomba, and Somiari (2012) maintain that the value and quantum of non-oil exports drastically declined. It has been established that the traditional manufacturing sector provides more efficient growth opportunities better than the extractive industry. This study tends to educate Nigerian stakeholder to finance textile industry for better product design to enhance economic development in Nigeria,

### OBJECTIVES OF THE STUDY

- 1) To examine the Effect of quality graphic design as metrics of Product Design on Nigerian Ankara Fabric product towards sustainability initiatives in Africa.
- 2) To examine the effect of colour as metrics of Product Design on Nigerian Ankara Fabric product towards sustainability initiatives in Africa.

## **RESEARCH HYPOTHESES**

- H<sub>0</sub>: Quality graphic design as metrics of Product Design has no significant effect on Nigerian Ankara Fabric product towards Economic Development in Africa
- $H_0$ : Colour as metrics of Product Design has no significant effect on Nigerian Ankara Fabric product towards Economic Development in Africa.

## CONCEPTUAL FRAMEWORK

#### Product design

Design is a fundamental part of the history, culture, and technology of societies all over the world. It is a critically important process in the business and creative industries affecting national prosperity. Design has also developed a significant media-centric and political focus especially in the environmental context where climate change is a serious contemporary issue. And there are other important trends that need consideration such as where design is heading in the future: Design is now a global process: designers need no longer be tied to a specific product manufacturing base or geographic setting—a computer file, which contains information that defines the physical characteristics of a product or component, can be sent electronically to a rapid prototyping facility on another continent and the finished prototype sent back by air in days or even hours. The global process of design also carries with it associated ethical, social and environmental responsibilities (Bonollo, 2010).

Product design takes a long time and a great deal of effort. It is important to target the design programme to minimize time and costs and to plan for it to be successfully completed within allocated resources. Time is very much of the essence, the minimum compatible with optimal development. In a product design plan, there are many activities to be first recognised and then coordinated; some activities are worked in sequence, some in parallel. Multidisciplinary activities are focused on the same direction and coordinated in time. The master plan coordinates the various people and their mini projects in an overall time and resource plan so that the product design can be controlled with perfect quality and colour. The plan begins with the product design specifications. These include a profile of the product characteristics as defined by the consumer, the structure and composition, safety factors, convenience, and aesthetics, and indicates the manufacturing, processing and storage variables and their effects on the product design specifications start as general descriptions; product design and process development focus them into definite, quantitative descriptions (Earle & Earle, 2000).

# Steps in product design and process development

Carrying out the design in the five successive steps listed as follows

i) Getting the feel'

This is a continuation of the development of the product concept and the product design specifications. The processing methods and conditions outlined in the product design specifications are used to make the early product prototypes, and the technical testing methods are examined for reliability and accuracy in testing both the technical product characteristics and their relationships to the consumer product characteristics. The choice of no consumer testing depends on the level of consumer knowledge held by the designer. The basic costing used in the company is also identified so that a simple method of determining costs can be used in the next stages of the product design. The target market was identified in the product concept stage and the consumers are selected to represent this target market(s).

ii) Screening

Screening reduces the wide range of raw material and processing variables to the input variables affecting important product qualities. This hastens the design. Initially the variables can be reduced using the previous knowledge of the designer and published or company information easily available. The screening experiments identify the important variables and their magnitude levels that affect the product qualities, but they are not statistically accurate and cannot quantify the relationships between the input variables and the product qualities. At this stage, the raw materials are being selected, and the quality, availability and costs of those raw materials are studied. There is likely a basic total cost range for the raw materials, but it is important not to select individual materials only on cost at this stage. Higher qualities of raw materials may give a unique property to the product, and the more expensive materials may not need to be used in the same quantities as the cheaper. Sometimes there are restrictions in the company on the raw materials that are to be used; the buying department can often give some indications without restricting the design.

iii) Ball-park studies

In ball-park studies, the aim is to set the limits of the raw materials and the processing variables which give acceptable product qualities as judged by the consumer. By this stage, the variables are reduced in number and their outside limits are set. They are examined in factorial designs, and for raw materials in mixture designs. In factorial designs each input variable is considered at high and low levels, and the combinations of these high and low levels for all input variables are tested.

iv) Optimisation

Here the aim is to optimise the overall product quality by determining the levels of the input variables which will give the best possible product quality. The problem is that often when optimising one product quality, another product quality is less than optimum. So, it is a case of setting the relative importance of product qualities, and for the most important product qualities studying the formulation and processing variables to find the optimum. But the limits that are acceptable across all the product qualities need to be known so that during the optimising experiments none of the other product qualities become unacceptable. For raw material formulations, linear programming can be used to optimise a number of product qualities and costs with the amounts of raw materials in the formulation held between upper and lower levels. Scale-up

Scale-up (or ramp-up) of both the production and the marketing is the last stage of the product design and process development. The production scale-up is the in-plant test to verify that the product can be made at the quality and

quantity required, and the marketing scale-up is a large consumer test to verify that the target consumers will buy the product and what marketing strategy will encourage this buying. The aim of the processing scale-up is to determine the optimum production process for product quality, product yield, process control and costs. If the previous design research has combined the product and the process, this can be achieved without too many problems. But if the process has been ignored, then there can be disastrous problems. For example, if some of the intermediate materials have never been pumped during the design experimentation, then they could break down during scale-up. The scale-up can be either on a pilot plant or short production runs on the main plant. If it is a new process, or there is to be quite extensive experimentation, then the scale-up is conducted on a pilot or small-scale plant. If the process is only an adaptation of the present production, then the scale-up is conducted on the main production plant. The decisions on the type of scale-up are often much influenced by cost; the production trial can cost a great deal if the product cannot be sold, and this restricts the use of the production plant until the final stage.

### Sustainability Initiative

A Global Guide as cited in Fadi (2011) stated that "sustainability for a business enterprise means adopting business strategies and activities that meet the needs of the enterprise and stakeholders today, while protecting, sustaining and enhancing the human and natural resources that will be needed in the future". Shrivastava as cited in Fadi (2011) on the other hand described sustainability as "offering the potential for reducing the long-term risks associated with resource depletion, fluctuations in energy costs, product liabilities, pollution and waste management".

Sustainability initiative is business approach that creates value for shareholders in the long run by generating opportunities and managing risks stemming from economic, environmental, and social developments. Sustainability initiative as management strategy not only helps businesses maintain prosperity for people and organizations but also to pursue long-term competitive advantage (Mohamed et al., 2014). The goal of sustainability is to develop organizational processes that contribute to business sustainability in meeting the needs of present and future generations for internal and external stakeholders (Abid, 2013). Dimensions of sustainability initiative consisting of profits with indicators of prices, share values and investor relations while the dimensions of planet are distinguished in environmental and neighbouring indicators and community dimension shows aspects of general management, work environment, safety & health, diversity, work ethics and globalization, consumers and suppliers (Marrewijk & Werre, 2014). Sustainability initiatives requires companies to consider the environmental and social consequences of operating core businesses and implementing and maintaining good corporate governance. The sustainability of company is broadly related to transactions that involve collaboration with suppliers. This is mainly due to increasing challenges to environment and social associated with business operations along supply chain that cannot be resolved by each company but can be resolved through collaboration with business partners (Econsense, 2013). Integration of sustainability initiative in business processes has an impact on short-term efficiency, company risk and operations management, in the service sector has more value than the manufacturing sector (Abid, 2013). Sustainability supports the process of accumulating intangible assets, strengthening the company's ability to identify, protect and provide values such as skills and competencies, value of knowledge, legitimacy, trust, and reputation among stakeholders (Francesco & Clodia, 2010). The pathway to adopting the principles of sustainability initiative is directed through organizational culture sustainability orientation (Linnenluecke & Griffiths, 2010).

## Carter & Rodgers Sustainability Model

The model of Carter & Rodgers (2008) was derived from the need to move away from a standalone thrive to achieve sustainability to a more collaborative approach. Within a business environment, this meant that managers were often working in a standalone fashion when initiating and managing projects. This ineffective approach needed to be replaced by a collaborative approach that is supported by understanding the strategic goals that support an organisations overall sustainability position. From the literature review, they suggested that organisational

sustainability consists of three components of natural environment, society, and economic performance. This analysis resulted in the triple bottom line sustainability model presented in figure 1 below:

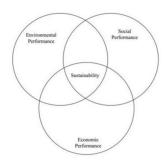


Figure 1 - Carter & Rodgers Triple Bottom Line Sustainability Model

### METHODOLOGY

The study utilized survey research design. Survey research design was suitable for study that involved large respondents. Primary source was used to enrich this study to proof its originality. The population of the study comprises of user of Akanra fabric in Ado-Ekiti, Nigeria. The study utilized convenience sampling technique to drawn sample of 235 for the study. This sampling technique was used to administered questionnaire to available personnel in the various concerned units among selected manufacturing companies utilized in the study. 5-point Likert scale options of structured questionnaire were used in the study to obtain respondents response. Content validity was used to determine the validity of the instrument and the value of the test of reliability was 0.87 which was calculated using test-retest reliability method. It indicated that there is internal consistency of the instrument. Simple percentage was used to analyze the data and Simple linear regression was used to test the hypothesis.

#### ANALYSES AND RESULT

Findings show the distribution of respondents on the bases of sex, age, and qualification. The analyses of distribution of sex shows that 167 were male representing 71.1% and 68 were female representing 28.9%. It shows that male was more than female in this study. The analyses of distribution of age of respondents shows that, out of 235, respondents, 53 falls between 25 – 34 years, 126 falls between 35- 44 and 56 falls within 45 years and above. Analyses of distribution of respondents show that 217 obtained HND/BSc. and 18 were holder of PGD /MBA and others.

#### Research hypothesis One

- H<sub>0</sub>: Quality graphic design as metrics of Product Design has no significant effect on Nigerian Ankara Fabric product towards sustainability initiatives in Africa
- H<sub>I</sub>: Quality graphic design as metrics of Product Design has significant effect on Nigerian Ankara Fabric product towards sustainability initiatives in Africa

Table 1

Regression Model Summary for H1

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
H1	.654a	.427	.425	35.19119

a. Predictors: (Constant) Quality graphic design (Product Design)

b. Dependent: Nigerian Ankara Fabric product

Source: SPSS Version 20

Table 2

ANOVA for H1

Model		Sum of Squares	Df	Mean Square	F	Sig.
	Regression	215315.333	1	215315.333	173.863	.000
H1	Residual	288551.799	233	1238.420		
	Total	503867.132	234			

a. Dependent Variable: Nigerian Ankara Fabric product

b. Predictors: (Constant), Quality graphic design (Product Design)

Source: SPSS Version 20

## **Decision Rule**

According to Table 1 and 2 above, the overall result for the regression model was significant (p = 0.000 < 0.05), thus results indicate support for the first hypothesis. We reject null hypothesis and accept the alternative hypothesis which state that quality graphic design as metrics of Product Design has significant effect on Nigerian Ankara Fabric product towards sustainability initiatives in Africa. The result considered that guality graphic design can be used to predict Nigerian Ankara Fabric product towards sustainability initiatives in Africa; it means that if quality graphic design is well estimated, the Nigerian Ankara Fabric product may also improve. Depending on the R Square value of (0.427), quality graphic design could explain 6.5% variation in Nigerian Ankara Fabric product towards sustainability initiatives in Africa. The analysis of variance (ANOVA) calculated F test was 173.863 and an associated significance p value of 0.000 (p value < 0.05) was significant. The implication was that the simple linear regression was good fit for the data.

## Research hypothesis Two

- H<sub>0</sub>: Colour as metrics of Product Design has no significant effect on Nigerian Ankara Fabric product towards sustainability initiatives in Africa
- H<sub>I</sub>: Colour as metrics of Product Design has significant effect on Nigerian Ankara Fabric product towards sustainability initiatives in Africa

Table 3 Regression Model S	ummary fo	r H2			
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	
H2	.614a	.377	.374	31.83664	

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		): Colour (Product Nigerian Ankara Fa						·
Table 4							 	
anova f	or H2							
	Model	Sum of Squares	Df	Mean Square	F	Sig.	l	
	Regression	142745.164	1	142745.164	140.834	.000b	l	
H2	Residual	236162.257	233	1013.572				
	Total	378907.421	234				l	
a. Deper	dent Variable: I	Nigerian Ankara Fal	bric product	•				
b. Predic	tors: (Constant	), Colour (Product	design)					
	C Varaian 20							

Source: SPSS Version 20 Decision Rule

According to Table 3 and 4 above, the overall result for the regression model was significant (p = 0.000 < 0.05), thus results indicate support for the second hypothesis. We reject null hypothesis and accept the alternative hypothesis which state that Colour as metrics of Product Design has significant effect on Nigerian Ankara Fabric product towards sustainability initiatives in Africa. The result considered that Colour as metrics of product design can be used to predict Nigerian Ankara Fabric product towards sustainability initiatives in Africa; it means that if Colour as metrics of product design is well estimated, the Nigerian Ankara Fabric product towards Economic Development in Africa may also improve. Depending on the R Square value of (0. .377), Colour as metrics of product design could explain 6.1% variation in Nigerian Ankara Fabric product towards sustainability initiatives in Africa. The analysis of variance (ANOVA) calculated F test was 140.834and an associated significance p value of 0.000 (p value < 0.05) was significant. The implication was that the simple linear regression was good fit for the data.

# DISCUSSION OF FINDINGS

The first hypotheses testify that quality graphic design as metrics of Product Design has significant effect on Nigerian Ankara Fabric product towards sustainability initiatives in Africa. Design therefore plays an important role in both the creation and development of meanings (Verganti, 2008) along the NPD process, and contributes to the functionality, aesthetics, and usability of products (Chiva and Alegre, 2007). Hertenstein et al. (2005) find that investments in design can generate financial returns in the form of more profitable sales, higher returns on sales, and higher returns on assets.

The second hypotheses testify that, colour as metrics of Product Design has significant effect on Nigerian Ankara Fabric product towards sustainability initiatives in Africa. Lysonski, Durvasula and Zotos as cited in Yu, Westland, Li, et al. (2018) posits that the visual elements of a product, or even its packaging, potentially affect consumer purchase decisions as it provides an attractive method to convey messages about product attributes at the point of sale. These visual elements influence consumers' choice of product (or choice within a product category) and colours are frequently a major component. Silayoi and Speecestate as cited in Yu, Westland, Li, Z et al. (2018) stated that indeed, colour is one of the most important elements of visual merchandising and can influence consumer behaviour and consumer purchase decisions. Shagal, Shagal & Sharma (2016) Javed & Javed (2015) posit that Colour can affect svisual identity and increase brand recognition. Barchiesi, Castellan and Costa (2016) argued that colour connects a product to consumers more quickly than any other identifying features.

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# CONCLUSION

From findings, it was revealed that quality graphic design and colour as metrics of Product Design have significant effect on Nigerian Ankara Fabric product towards sustainability initiatives in Africa. Design is now a global process: designers need no longer be tied to a specific product manufacturing base or geographic setting; a computer file, which contains information that defines the physical characteristics of a product or component, can be sent electronically to a rapid prototyping facility on another continent and the finished prototype sent back by air in days or even hours. Product design takes a long time and a great deal of effort. It is important to target the design programme to minimise time and costs and to plan for it to be successfully completed within allocated resources. Time is very much of the essence, the minimum compatible with optimal development. In a product design plan, there are many activities to be first recognised and then coordinated; some activities are worked in sequence, some in parallel. In particular, multidisciplinary activities are focused on the same direction and coordinated in time.

## RECOMMENDATIONS

The study attracts the following recommendations as follows

- 1) Manufacturing company's manager should establish a design that can entice the society to patronize their Ankara fabric product,
- 2) Manager should involve in proper planning of effective design that persuade customers to purchase their product.
- 3) Manufacturing activities should imbibe good graphic design and colour to polish the image of their product.
- 4) Good product design and attractive colour should be encouraged by textile manufacturers to show case Africa culture and integrity.

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