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THE PROFITABILITY, HEALTH AND ENVIRONMENTAL IMPLICATIONS OF 'ADIRE' PRODUCTION IN ABEOKUTA, OGUN STATE, NIGERIA

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ABSTRACT

Clothing materials are one of the basic necessities of life. Traditional clothing materials popularly called 'adire' thrive in Abeokuta, Ogun State, Nigeria due to the rising demand from an expanding population. This study revealed that over 70% of the producers are female with 23.3% male. The 'adire' industry provides income and employment and thus contributes to the GDP of the nation. Despite its significance, effluents from the industry contribute to environmental degradation and further affect the health of producers. Health problems identified include skin rashes, ulceration, swelling, respiratory diseases and complications during delivery. In addition, available water bodies serve as waste receptacle for effluents from the industry thereby disturbing aquatic biodiversity while those discharged on land affect the terrestrial diversity. Despite the negative impact, the cost and return analysis of the industry showed profitability. At Itoku, a profit of ₦117,600 was made and at Asero, a profit of ₦110,700 was made from small enterprises producing 'adire' in the two locations. As a result, more people will be attracted into the industry. In view of this, recommendations were made to protect man and the environment from effluents discharge of the indigenous industry. Such recommendations include education, proper waste management and legislation to improve production methods and consequently enhance living standards.

Key words: 'Adire' textile, GDP, effluents, profitability, aquatic, environment.

INTRODUCTION

Textile has been described as a basic necessity of life that is demanded throughout the world by the rising population (Opeolu and Fadina, 2005). However, diverse industries are engaged in textile production. Some industries produce fine linen and others produce 'adire'. The indigenous textile industry's specialized in the production of 'adire'. The industry is a viable one especially in Ogun State of Nigeria. It attracts foreign earnings from both regional and international markets. Therefore, it is not an over statement that 'adire' as a product of the industry competes favourably well in international markets as aesthetic products. The indigenous textile industry contributes to the GDP of the nation in many ways. It is a cottage industry providing employment for the local people, earns foreign exchange through exportation and increases government revenue through tariff and taxes.

The negative externality of the industry is a major concern to the populace where the industry is sited. Groff (1993) reported on

the toxicity of 'adire' effluent due to its complex nature. The effluent contains detergents, dyestuffs and some heavy metals. It contains a wide range of dyes such as azo, diazo, azoxy and anthraquinoid compounds, cobalt and chromium from metal based complex dye, surface active surfactants such as alklyl benzene sulfonate and sodium tripolyphosphate ($Na_5P_3O_{10}$) (Groff, 1993). The effluent generated is discharged on land or nearby water bodies which serve as waste receptacle for the industry. The poor disposal of the effluent causes negative externality which imposes a social cost on the health of the people.

Accordingly, Clarke and Anliker (1980) reported on the pollution potential of dyestuffs to be primarily toxicity and carcinogenicity. Opeolu and Fadina (2005) reported that the effect of effluents has been discovered to be toxic to flora and fauna diversity. The significance of the indigenous textile industry to the economy and health of the populace underscore the objectives of this study which are:

- To identify the different types of 'Adire' products
- To determine employment creation within the industry on gender basis
- To identify the health related problems in 'Adire' production
- To identify the effects of effluents on the producers and the environment
- To determine the profitability of 'Adire' production in the study area

Textile Production Process

There are several types of 'adire' material produced by the textile industry. In producing these products, useful materials include candle wax, soda, sodium hydrosulphate and the dye. Plain low quality cloth popularly called 'Teru' mainly or other cloth types used was first soaked in water, sun dried and stamped with candle wax to make patterns; chemicals and dye are mixed together in a bowl and the clothes soaked in the mixture. The cloth was left for an hour soaked and thereafter removed and drained of water. After this, the cloth was dipped in hot water as treatment to remove candle wax. At this point, the cloth was starched and sun dried. This procedure is similar to tie and dye except that in the latter treatment, the cloth will be folded into small bits and it requires smaller quantities of dyes and chemicals.

METHODOLOGY

Study Site

The study areas are Abeokuta North and South Local Government Areas (LGAs) of Ogun State, Nigeria. It is located between latitude 7°5'N and longitude 3°25'E. Abeokuta was founded in 1830 by Egba people and is located between River Ogun and Olumo rock. The rock is a massive outcrop of granite origin of primitive formation forming part of plateau of Yorubaland from which the town derived its name, Abeokuta – meaning under the rock. The area is situated in the derived savannah rainforest belt of Nigeria with annual rainfall of 100 – 150cm (Oyesiku, 1992; Iloeje, 1978). It is characterized by two distinct seasons. The longer wet season lasts for eight months (March – October) and shorter dry season of four months (November – February). The relative humidity is high all the year round generally above 80% during the wet season and varies between 60 – 80% during the dry season. Major economic activities in Abeokuta include quarrying, sawmills, block making, clothing and pottery. Clothing simply referred to as 'adire' making is wide spread in two major locations in the study areas. They are Itoku and Asero with prominent Interna-

tional Market in Itoku especially for sub-regional trading in West Africa for 'adire'.

Sampling Procedure and Sample Size

Stratified sampling was used to select respondents within the LGAs. Each LGA represents a stratum. From each stratum, respondents were selected randomly from specified locations in Itoku and Asero. In stratum one, over 25% of the respondents were selected with a total number of 40 respondents and in stratum two, 20 respondents (25%) were equally selected of the total respondents. From the two strata, 60 respondents were selected of the total respondents with 'adire' market in Itoku twice the size of Asero market. Furthermore, 'adire' was popularized at Itoku market with expansion of the market spilling over to Asero. Therefore, with a sampling frame of 60 respondents and a selection ratio of 2:1 within adire markets, 40 respondents were selected in Abeokuta North (Itoku) and 20 respondents selected in Abeokuta South (Asero).

Data Collection

Sixty structured and pretested questionnaires were administered on randomly selected respondents who were involved in 'adire' cloth making in the study areas. The questionnaires were distributed to cover the two local government Areas involved. Data were collected on the socio-economic characteristics of the respondents, on 'adire' production and the social and health problems relating to 'Adire' textile industry.

Method of Data Analysis

Descriptive statistical tools such as frequencies and percentages were used to analyse variables of interest. The results of the analyses were presented in form of tables for reference purposes and discussion. Budgetary tool of costs and returns analysis was used to show the profitability of the textile industry.

RESULTS AND DISCUSSION

Socio-economic characteristics of respondents

Forty respondents representing 67% of the respondents had no formal education while only about 5% of the total respondents had secondary education and 28% had primary education. (Table 1). This indicates that acquisition of skill in indigenous textile industry is not entirely dependent on formal education. However, formal education could contribute to sustainable economic growth of this industry. It could also enhance the quest for value addition to dye from plants and other processing raw materials.

On the scale of operation, more respondents were found in the medium scale 41.7% due to the capital outlay of the operation. However, the large scale operation had the least respondents 21.6% due to high capital requirement and processing experience.

Products identified among the Producers by gender groups

Seven different types of textile materials were identified in this study (Table 2). They are *Batik, tie and dye, awilo, katikati, abere, oni-machine and guinea design.* Tie and dye was found to be predominating with 60% of the respondents found to be involved. The bulk of the tie and dye entrepreneurs were recorded in Itoku probably for the commercial market of 'adire' in the area. On the mode of operation, indigenous textile production was carried out on full time basis mainly, however there are part-time entrepreneurs combining the activity with other jobs such as trading.

Employment creation within the industry by gender

The gender and age distribution of the respondents in the two strata studied are shown in Tables 2 and 3. The Tables revealed that 14 respondents (23%) of the total respondents were males while the remaining 77% were females. The large incidence of female could be because the activities of the indigenous textile industry are mostly carried out by women such as textile trading. This observation is in line with ILR (1998) that authenticated the concentration of women into jobs described as being traditionally female. The tables also indicated age distribution of respondents. It was found that indigenous textile activities were mostly carried out by active working age groups of between 31 and 50 years old with those within the age bracket of 31 – 40 years predominating with 48.3% of total respondents. The low incidence of youth below the age of 20 years could be because they were in schools.

Types and characteristics of Health problems

The various health problems associated with indigenous textile industry are summarized in Table 3. According to the table, eight diseases related to the textile industry were identified ranging from skin diseases to respiratory diseases and others such as malaria and associated headaches that resulted from weak immune system coupled with mosquito bites in the environment leading to full blown malaria condition.

Health related problems of the respondents stemmed from the use of synthetic dyes which are corrosive on skin mostly. Natural dyes are less preferred because most respondents claimed that the resulting 'adire' material made from natural dyes have poor demand by consumers. In addition, most respondents have poor knowledge of extracting or dealing with natural dyes.

The physico-chemical analysis of effluent of indigenous textile industry reveals that the effluents are toxic to both aquatic and terrestrial organisms with synthetic dyes.

Table 4 indicates the level from our analysis and the FEPA Standard of physico-chemical parameters to reveal the level of toxicity of the effluent. In addition, the black colouration of the effluent when discharged into aquatic environment affect visibility as well as primary production in the environment since algae cells would be affected and consequently photosynthesis.

FEPA- Federal Environmental Protection Agency

Table 4 indicates high alkalinity. Accordingly, Foulds (1990) reported that dyes effluents contain dye residues and alkaline salts. High alkalinity is therefore in line with pH results. High alkalinity of effluents has been attributed to presence of hydroxides especially at pH greater than 10. This may be true for dye effluents due to the presence of hydrosulphate as a major constituent of dye preparation.

Trivedi and Dubey (1978) reported that dissolved oxygen in rayon industry effluent was nil. This may result in increased toxicities of phenol, zinc, copper and lead. Previous studies have reported minimum dissolved oxygen in freshwaters for survival of organisms. This was put at 5mg/l (Neely, 1994). This minimum level could not be obtained in effluent of the textile industry since the biochemical oxygen demand of cellulose and fibre of the organic content of the textile industry was high. The effluent therefore is deleterious to aquatic environment if

discharged into such environment as a waste receptacle. High total suspended and dissolved solids have been reported to raise turbidity of water bodies resulting in reduction of light penetration. This therefore reduces photosynthetic activities of plants, algae, abrasion of fish gills, impairment of filter feeding among others (McEldowney and McEldowney, 1996). There is no FEPA limit for hardness for discharge into surface waters but it is worthy of note that water hardness also affects metal toxicity in waters. High level of chromium in the effluent could result in skin ulceration or cancer as reported by Adam *et al*. (1995) that possible skin cancer could be due to chromium exposure.

Table 4 further revealed that effluent toxicity contributes to sicknesses amongst the producers as listed on Table 3. Furthermore, all respondents dispose their wastewaters on either bare ground or into open drainage system which may be eroded or discharged into nearby streams. The implication of this is that nearby streams are polluted with residues of substances like chromium, sulphate, detergents, cellulose from the textile, phenols, solids and dye residues.

Consequently, there is increasing chance for eutrophication, oxygen depletion, loss of aquatic lives and others in affected water bodies. On terrestrial environment, pore spaces are sealed, percolation reduced, flora diversity disturbed while high run-off is a common feature in such environment. However, attractiveness into the business is reflected in the cost and return analysis (Table 5) that showed profit for the two locations. The profitability of the enterprise provided the incentive for entrepreneurs.

The incentive, is however, in addition to low capital requirement for the enterprise. The combination of these factors encouraged growth of 'adire' business in the two locations.

Table 1: Demographic Characteristics of Respondents

Factors	Location		Total	Percent
	1	2		
Marital Status	Itoku	Asero		
Married	28	21	49	81.7
Single	7	4	11	18.3
Total	35	25	60	100
Gender				
Male	9	5	14	23.3
Female	30	16	46	76.7
Total	39	21	60	100
Age				
< 20 yrs	2	1	3	5.0
20 – 30 yrs	17	7	24	40.0
31 – 40 yrs	18	11	29	48.3
41 – 50 yrs	2	-	2	3.3
> 50 yrs	1	1	2	3.3.
Total	40	20	60	100
Educational Status				
Primary school	12	5	17	28
Secondary school	2	1	3	5
No formal education	26	14	40	67
Total	49	20	60	100
Scale of Operation				
Small	14	8	22	36.7
Medium	19	6	25	41.7
Large	8	5	13	21.6
Total	41	19	60	100

Source: Field Survey, 2007

Table 2: Gender Distribution of the Respondents

Type	Stratum 1 Itoku		Stratum 2 Asero		Total	% Total
	M	F	M	F		
Batik	1	6	1	3	11	18.3
Tie & dye	5	20	2	9	36	60.0
Awilo	-	2	-	1	3	5.0
Katikati	1	1	-	1	3	5.0
Abere	-	1	-	1	2	3.3
Onimachine	-	1	-	1	2	3.3
Guinea	1	1	1	-	3	5.0
Total	8	32	4	16	60	100
Mode of Operation						
Full-Time	7	26	4	12	49	81.7
Part-Time	1	6	-	4	11	18.3
Total	8	32	4	16	60	100

Source: Field Survey, 2007

Table 3: Summary of Health related diseases into Indigenous Textile Industry

S/No.	Type of Disease	Respondents affected	% of Respondents
1.	Skin rashes	3	5.0
2.	Skin ulceration	9	15.0
3.	Rashes and ulceration	8	13.3
4.	Swelling of skin	4	6.7
5.	Skin swelling and Rashes	7	11.7
6.	Respiratory diseases	16	26.7
7.	Complications at delivery		
	Still birth	2	3.3
	Premature deliveries	5	8.3
8.	Other diseases	6	10.0
	Total	60	100

Source: Field Survey, 2007

Table 4: Physico-chemical parameters of the effluent

Parameter	Level	FEPA Standard
pH	12.35	6 – 9
Alkalinity (Phenol)	376mg/l	N/A
Alkalinity (Total)	580mg/l	N/A
Total hardness	6.06mg/l	N/A
Dissolved oxygen	ND	N/A
BODs	16,00mg/l	50mg/l
Suspended Solids	26,485mg/l	30mg/l
Dissolved Solids	107,036mg/l	2,000mg/l
Total Solids	133,521mg/l	N/A
Phenol	1.3mg/l	0.2mg/l
Sulphide	4.45mg/l	0.2mg/l
Chromium	2.3mg/l	<1mg/l
Odour	Irritating	
Colour	Black	

Source: Field Survey, 2007

NB: ND – Not detected
N/A – Not Available

Table 5: Cost and Return Analysis in 'Adire' Textile Industry per respondent (Tie and Dye) for Small Enterprise

Description	Itoku	Asero
Qty of Output	240	205
	N	N
Unit Price	1,500	1,500
Gross Annual Return	360,000	307,500
Variable Cost		
Input Cost	192,000	164,000
Transport Cost	48,000	30,000
Total Variable Cost (TVC)	240,000	194,750
Gross Profit (GP)	120,000	112,750
Fixed Cost (FC)		
Depreciation	2,400	2,050
Total Cost TC (TVC+TFC)	242,400	196,800
Net Profit		
NP = (GP – FC)	117,600	110,700

Source: Field Survey, 2007

CONCLUSION

It is clear from the cost and return analysis that 'adire' production is a profitable enterprise that cuts across all age groups. With net profit of N117,000 at Itoku and N110,700 at Asero locations, there is no doubt that 'adire' production contributes to the GDP of the country. Furthermore, the net profit indicates that 'adire' business is a viable one that entrepreneurs would like to undertake despite the risk and the health hazards of the enterprise. There is no doubt that attempts to prevent or stop production of the 'adire' business would be seriously resisted by the people despite environmental issues associated with the indigenous textile industry.

RECOMMENDATIONS

In view of the above, it is hereby suggested that the following could be done to improve on the production methods of the people. Stakeholders in indigenous 'adire' textile industry should be educated on methods of protecting and preventing of hazards during production. This will ensure a safe environment for all. However, majority (67%) had no formal education, a condition that calls for adult literacy programme among producers and adequate enlightenment campaign in areas of production.

Entrepreneurs must be given the opportunity of disposing wastes from 'adire' making in a proper manner. Ethical consideration must evolve to protect the environment from poor disposal of deleterious wastes. Available streams and nearby water bodies must be avoided during disposal under ethical means.

It is important to formulate policy that will take into consideration the disposal of waste from indigenous textile industry. Such policy will regulate indiscriminate disposal and will protect producers from the health hazards.

The above recommendations will go a long way towards developing the indigenous textile industry and ensuring a safe environment for the generality of the people involved and residents around the areas of production.

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