Evaluation of Granite Production and Market Structure for the Improvement of Sales Performance in Ondo and Ogun States, Southwest Nigeria

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ORIGINAL RESEARCH ARTICLE

Abstract- Poor marketing infringes the rate of production and supply of quarry end products and limits the supply rate between the producer and the industrial users. This study aimed at assessing the structure, conduct, and performance of the granite marketing system in Ogun and Ondo, recognizing and characterizing the opportunities and constraints on market participants which influence its performance. Ten granite quarries located in the southwest, Nigeria were considered in this research. The granite quarry sales and production information were derived from both primary and secondary sources. Descriptive statistics in analysing the data collected from granite traders in the study areas. Descriptive statistics, ratios, percentages, means, and standard deviations were utilized to compare the socio-economic and institutional characteristics of the granite product traders in the two case studies. The connection between the granite sales market design, direct, and execution was analysed utilizing the structure-conduct-performance model. The Gini coefficient and Lorenz Curve analysis indicated that the granite market in Ogun state is highly competitive for both the producers and wholesalers, and it is not controlled by a few traders. It is therefore recommended that government and private sector should promote processing which involves making financing facilities available so that the private sector will be encouraged to invest in processing activities, and that government should also provide an incentive to the private sector to continue improving the state of technology processing.

Keywords- granite, Market structure, Nigeria, Quarry aggregates, production evaluation, Structure-Conduct-Performance model

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1 INTRODUCTION

The granite quarry is a sort of mining method from which industrial rocks are separated for modern industrial application. Odunaike *et al.,* (2008) also reiterated the use of quarry dust as a means of "re-mineralization" of soils. Hence, granite quarrying being the only source of these raw materials is a major activity in many parts of the world where mineral deposits such as hard rock and sand, and gravel are available (Bani Baker, 2017). Odunaike *et al.,* (2008) indicated that end product materials gotten from quarrying include marble, gravel, granite, and limestone aggregates are inevitable in modern civil engineering and construction works.

Quarried blocks are utilized cut for confronting structures; it is also utilized in modern creation processes including toothpaste, beauty care products, paints, and plastic. According to the Federal Bureau of Statistics (2004), the broad industrial sector of mining under which quarrying is classified contributes 37% to Nigeria's Gross Domestic Product. Harriss (1993) shown that market structure consists of the characteristics of the organization of a market which directly or indirectly influence the strategic nature of competition and pricing within the market. Funke *et al.* (2012) noticed that, the market activity comprises of the degree of aggregation of purchasers and merchants, reconciliation, item separation, and the level of contest among the purchasers and dealers of products.

Structure, control and performance model have shown great usefulness in business improvement in the past decade, according to Funke *et al.* (2012) the market structure, control and performance (SCP) model beginnings from the neo-customary examination of business areas. Schmalensee (1989) shown that, market structure, direct and execution on (SCP) model start to use in the Harvard way of thinking, later revelation improvement in 1940-1960. The retrogressive association between the degree of market centre and the degree of competition has been the essential doubt of the market SCP hypothesis. The most broadly perceived are the utilitarian, the institutional, the item draws near, and the structure conduct and performance model.

The utilitarian methodology includes the considering of the showcasing system is identified with exercises in shipping the completed item from the maker to the last users. According to Cramers and Jensen (1982) this investigation approach helps to determine the relationship between the cost and the benefits of various available marketing functions. Cramers and Jensen (1982) indicated that, the institutional approach considers the activities of business organizations or people in marketing. The approach concentrates on the responses and performance of various marketing institutions' activities. Also, the commodity approach focuses on what is put in place to the product after it has been transferred from its original production place to the final consumer (Kohls and Uhl, 1985).The incredible conceivable outcomes of stone total publicizing in the mineral area of Nigeria can't be over highlighted, notwithstanding, its creation isn't sufficient market-organized, and the current level of force among restricted degree quarry holders is confined as a result of lack of good monitoring structures.

Despite the diverse authoritative technique interests to fabricate the advanced use of mine products, there is an

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absence of observational evidence on the complete granite aggregate production, the construction, conduct, and execution of its showcasing structures in Nigeria. This paper evaluates the current granite aggregate supply and promoting structure execution in Ondo and Ogun state, Nigeria. The operational characteristics of granite stone quarries in Ondo and Ogun States will be examined; the granite marketing systems in Ondo and Ogun States will be characterized; the structure, conduct and performance of the granite marketing system in the states will be assessed and compared; and the constraints faced by traders in the granite market in Ondo and Ogun States will be identified. The market structure broke down was done dependent on market fixation practiced by merchants and hindrances to showcase passage for expected dealers.

2 RESEARCH METHODOLOGY AND DATA ANALYSIS APPROACH

The modern mineral mining activity is led at both little and huge scope around the case study area. Ogun State is found in Southwest Nigeria; situated within latitude 7°00' N and longitude 3°35' E. Ondo State lies within latitude 7°10' N and longitude 5°04' E as displayed in Figure 1.
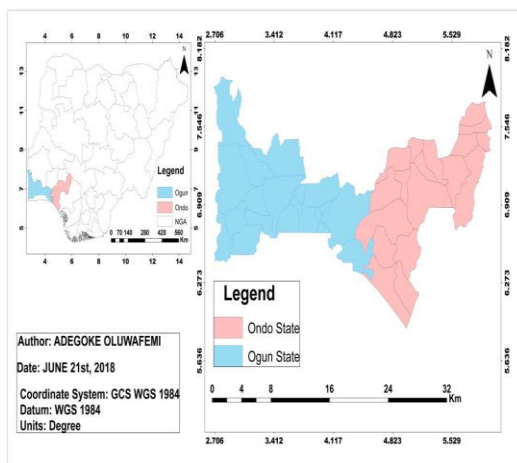

Fig. 1: Map Showing Ogun state and Ondo state as the case study Area

A total of ten quarries were selected (6 quarries in Ogun state and 4 quarries in Ondo state) for this research work as shown in Table 1.

Table 1. List of Selected Quarries in Ogun and Ondo States, Nigeria

S/N	ID	Location
1	Ondo 1	Ita-Ogbolu, Ondo State
2	Ondo 2	Akure, Ondo State
3	Ondo 3	Akure, Ondo State
4	Ondo 4	Akure, Ondo State
5	Ogun 1	Obafemi Owode, Ogun state
6	Ogun 2	Odeda, Ogun state
7	Ogun 3	Ijebu North, Ogun state
8	Ogun 4	Ijebu North, Ogun state
9	Ogun 5	Obafemi Owode, Ogun state

2.1 SAMPLING COLLECTION TECHNIQUE

Data for this study were derived from both primary and secondary sources; Primary data was gathered largely through a set of detailed and well-structured survey questionnaires. The survey questionnaire was specially designed to track various alternative channels used in granite market supply and to capture the associated prices, volumes, and transaction costs. The information collected includes; data on granite advertising tasks, the number and relative significance of different members as far as volume of the granite sold, the profile of market members, the level of their cooperation; the progression of data on economic situations; the level of organization and connection among purchasers and merchants; frequency of transactions; the points of transaction in granite buying and selling; quantity and quality of the traded granite product; seasonality of transactions; the cost of granite handling, cleaning and processing; marketing costs and margins; and information on perceived strength and weakness of the granite business operation. The sample size was computed according to Eq. 1 provided by Kothari (2004).

$$N = \frac{z^2.p.q}{e^2} \tag{1}$$

Where; N denotes sample size; z denotes confidence interval, p is 0.5% (the normal extent of the number of inhabitants in the granite merchants); q is 1-0.5 and e is 8% (the allowable margin of error). One hundred and fifty (150) samples were considered for this research work. Secondary data that were obtained incorporate the guide of Akure Township through the Open Street Map and the shape file of Ondo State. Other secondary sources of information will incorporate diaries and government distributions such as royalty payment per ton.

2.2 ANALYTICAL TECHNIQUES

Descriptive Statistics Data Analysis and Structure-Conduct-Performance (S-C-P) Model were used to analyse and compare the socio-economic and institutional characteristics of the granite product traders in the study area. Gini-coefficient is used to measure the distribution of inequality in income in the survey area.

2.2.1 S-C-P Model

Structure-Conduct-Performance model is one of the economic analysis models used for evaluating the causal relationship between market structure, conduct, and performance. Wolday (1994), used the S-C-P model to evaluate the food grain market in AlabaSiano district, Hakobyann (2004) applied the model for identifying factors that determine the competitiveness of the dairy market behaviour of the firm and the success of the dairy industry in meeting performance goals.

This study adopted Structure-Conduct-Performance model to evaluate the efficiency of the granite market in the case study areas. Lorenz curve as an economics tool was adopted to show the quantitative relationship between the granite trader percentages cumulative and that of the volume of granite sold in the market to establish the granite market efficiency. The Lorenz bend was utilized to show the quantitative connection between the aggregate rates of stone dealers against the total level of the volume of rock sold in the business sectors. The

Gini coefficient was spotted from the Lorenz curve to measure the inequity in granite sale distribution among the different trading groups in Ondo and Ogun States. A multivariate regression model was created on SPSS to give an expectation model to further develop the net revenue of stone total creation.

2.2.2 Analysis of Sales Conduct
Bain (1968) indicated that, market conduct is the pattern of behaviour followed by firms to adapt to market buying and selling structure. In this paper, the conduct of the sale of granite market was examined in a descriptive manner based on pricing strategies, advertising and sales promotion, and terms of sale.

2.2.3 Analysis of Market Performance
The cost of production used in the process of granite aggregate production for both Ogun and Ondo States quarries were gathered. The response to conducted open-ended questions was also used to identify major problems relating to granite finish product sales in the study areas.

2.2.4 Profit Prediction Model
Thirty-five (35) datasets were collected from the granite's quarries including, the total production, total cost, royalty, and total revenue. Multi variant regression (MVR) empirical model was developed in SPSS for the prediction of generated profit from granite quarry using total production, total cost, royalty, and total revenue as the input variables.

3 RESULTS AND DISCUSSION
3.1 OPERATIONAL CHARACTERISTICS OF THE SELECTED QUARRIES IN OGUN AND ONDO STATES
In order to identify the market performance of the selected quarries, primary data was collected to understand the quarries operation characteristic. The primary data result collected from all the case study quarries reveals that 17% of the selected quarries started their mining business between 1 to 5 years while the majority (83%) has been involved in production for 6 to 10 years. This result implies that most of the studied quarries are no longer new in the business and must have acquired a reasonable level of professionalism so as to improve their operational efficiency within the period of their operation life.

The survey conducted also reveals that 17%% of the quarries have a mine life ranging between 1-5 years while the majority (83%) can last for between 6-10 years. The survey result shows that, Ogun 1 quarry has the highest production capacity of 1,400,000 tons per annum. This is closely followed by Ogun 4 quarry which posed 1,200,000 tons per annum. Ogun 5 quarry produce 700,000 tons per annum, Ogun 2 quarry produce 600,000 tons per annum while Ogun 3 and Ogun 4 quarries posed 450,000 tons per annum and 400,000 tons per annum respectively. Among the selected quarries in Ondo State, Ondo 1 quarry was found to record the highest production capacity of 1,200,000 tons per annum. While Ondo 2 quarry recorded 900,000 tons per annum, Ondo 3, Ondo 4, and 5 quarries recorded 850,000 and 500,000 tons per annum respectively. The analysis carried out shows that, 67% of the selected quarries in Ogun State sold between 5001

tons to 10,000 tons on a daily basis while 33% sold between 500 tons to 5000 tons.

3.2 MARKETING CHANNEL
Figure 2 present the various adopted market channels by the case study quarries. Three channel structures were identified from the case study quarries which can be describe as the zero-level market channel (quarry to end users), the one level channel, and the two-level channels. The one level channel involves the quarry product bee sold out to the wholesaler who markets the product to the end user. In other way round, the two-level channels involve two intermediates (wholesaler and retailer) before the finally delivery to the end user.

1. Quarry ⟶ End User (zero-level channel / channel 1)
2. Quarry ⟶ Wholesaler ⟶ End User (one-level channel / channel 2)
3. Quarry ⟶ Wholesaler ⟶ Retailer ⟶ End User (two-level channel / channel 3)

Fig. 2: Different Granite market level channels use in Ondo and Ogun States

3.3 CHARACTERISTICS OF MARKETING CHAIN
The lengths of the marketing channels are not the same for the different marketing channels; hence the time taken for the product to move from the production point to consumption points varies.

The marketing channels present in Figure 2 indicate that in each channel, the relationship among most granite participants is just on oral agreements. The granite market in Ogun State contains three channels, while channels one (1) and two (2) are most common in the Ondo State market.

3.4 MARKET CONCENTRATION
The proportion of the encased region between the Lorenz curve and the inclining to the absolute region under the corner to corner of a market sale curve is alluded to as the Gini coefficient (Hakobyan, 2004). The Gini coefficient mainly ranges from zero to unity, increase in the coefficient value suggests a higher market concentration and vice versa. Gini coefficient of one shows perfect uniformity; a value greater than 0.5 demonstrates market imbalance, while 0.2 to 0.35 shows impartial dissemination in market.

Figures 3 and 4 present the Lorenz Curve for Producers and wholesalers in the case study areas Granite Market. From Figure 4 the Gini coefficient for Ogun granite market is evaluated to be 0.28, the granite which indicate a highly competitive market for both the producers and wholesalers and it is not controlled by a few traders (Hakobyan, 2004). The same can be said of the granite market in Ondo State as shown in Figure 4 with 0.27 Gini coefficients. Comparatively, there seems to be more competition among granite traders in Ondo State than in Ogun State as depicted by the Gini coefficients of the both states granite market concentration. The Gini coefficient value for both state granite market show that granite

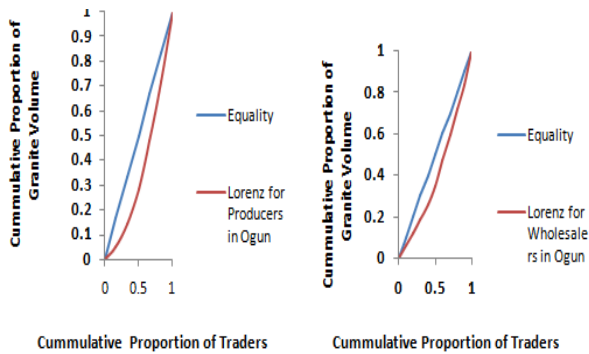market is very competitive and equally distributed in both states.

Fig. 3: Lorenz Curve for Producers and wholesalers in Ogun State Granite Market
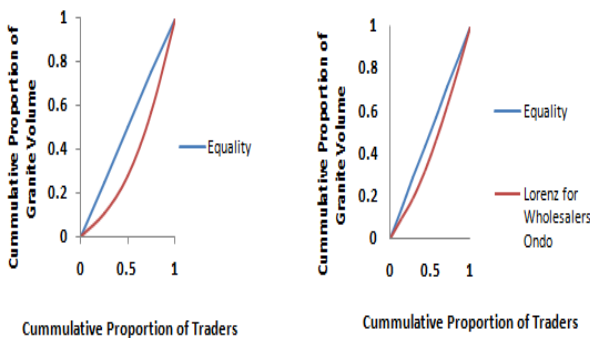

Fig. 4: Lorenz Curve for Producers and wholesalers in Ondo State Granite Market

3.5 MARKET CONDUCT RESULT

The aspects used to capture the pattern of behaviour followed by granite traders in adapting to the market situation include pricing strategies, advertising and sales promotion, and terms of sale. The most common pricing strategy observed among producers was that of competitive pricing, where they had three options; to lower their price, raise the price, or set the same price as competitors. Producer's response indicated that, the prices of other producers in the area dictates their granite price looking at the price of the competitors.

After observing competitors' pricing, 49% of the producers opted to maintain the same price as competitors while 51% chose to lower the price in order to attain more buyers. Among the wholesalers, it was observed that the common practice was that of the cooperative societies they belong to setting a unilateral price. The results differ from those of Olukosi *et al.* (2005) who found bargaining/negotiating as the most common pricing strategy for vegetable traders in Nigeria (50 percent). The difference can be Tadesse (2011) also reported bargaining of prices (42%) to be the most common practice among traders of fruits and vegetables in Ethiopia as compared to lowering prices (33 percent) and maintaining them (25 percent). Some of the market participants engaged in some sort of advertising for their products.

3.6 MARKET PERFORMANCE

Figure 5 shows the operating expenses on aggregate production in terms of salary. From Figure 5, the Quarries in Ondo State has the highest salary paid, explosive used, cost of equipment, the lubricant used, and even the total cost incurred with ₦35,595,000 compared to Quarries in Ogun state with ₦28,087,500 as the total production expense. It was discovered that both quarries spend high capital on salary payment. The finding also shows that Ondo state quarrying operation invests higher capital on granite production than those case study granite industries in Ogun state. Figure 6 present the results of open-ended request question survey conducted on the market limiting factor. From the result, the most limiting factor (40% of the respondents) is revealed as the inadequate start-up capital; the second (33% of the respondents) is noted to be lack of market information.

Other factors were price instability (25% of the respondents), lack of standard measure (15% of the respondents), long-distance movement between supply and release markets (10% of the respondents), and Poor access to credit (7% of the respondents) respectively. The least limiting factor was poor road infrastructure which had a percentage of 3% of the respondents. This shows that quarry operation profitability depends strongly on the start-up capital and as well as market price instability.
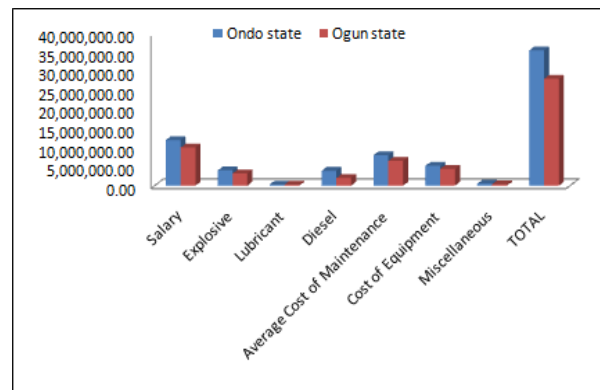

Fig. 5: Comparison of Operating Expenses in Aggregate Production per Month at Quarries in Ondo and Ogun states (1dollar ($) equivalent to 413.74 Naira as at December, 2021)
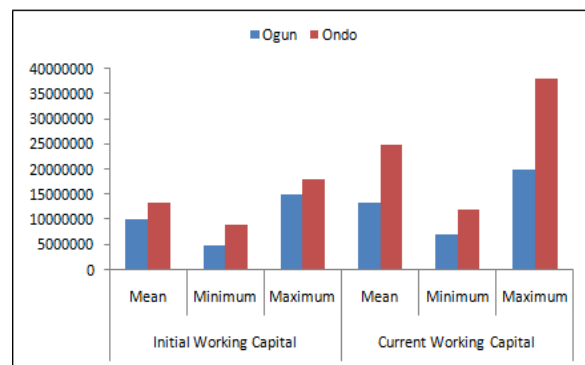

Fig. 6: Financial working capital for Ogun and Ondo state traders (1dollar ($) equivalent to 413.74 Naira as at December, 2021)

3.7 BARRIER TO ENTRY INTO THE GRANITE BUSINESS

The granite traders in both states mentioned two barriers to entry into the granite marketing system: the initial capital and the working capital. The initial capital is at least one billion naira (₦1,000,000,000) for the granite producers (quarry), while the minimum average monthly working capital is seven million naira (₦7,000,000). Moreover, as it is shown in Figure 5, that the maximum initial working capital for Ondo State traders was estimated to be 1.4 times higher than that of initial working capital for Ogun State traders, while the maximum current working capital for Ondo state traders was estimated to be nearly two times higher than maximum working capital for Ogun granite traders.

3.8 RELATIONSHIP BETWEEN PROFIT GENERATION AND PRODUCTION VARIABLES BY THE SELECTED QUARRIES IN THE STUDY AREAS

The regression analysis carried out to show the relationship between the amount of profit generated by the quarries and the production variables. The model summary reveals that the correlation coefficient is 0.999 which implies a positive and high correlation between the profit generated and the included production variables. The MVR model is shown in Equation 2.

$$Gp = 198.512TP - 0.993TC - 0.297Royalty + 0.949TC - 51988881.097 \qquad (2)$$

Where, GP is the generated profit in Naira, TP is Total Production, TC is the Total Cost, and TC is the Total Revenue.

4 CONCLUSION

This study attempts to limit the gap in granite market behaviour by looking at the marketing framework in two significant stone delivering states, Ogun and Ondo; and give new experiences on how the presentation of the advertising framework might be upgraded to further develop intensity. The following conclusions are drawn from the research:

1. Both states (Ogun and Ondo) featured large central marketplaces that provided significant wholesale and retail services for granite trading.

2. Several intermediaries are involved in granite marketing at different levels. In this study, Producers and wholesalers are majorly identified as granite market role-players.

3. The finding reveal that Ondo state quarrying operation invests higher capital on granite production than those case study granite industries in Ogun state.

4. As indicated by the Gini coefficient market evaluation approach, Granite trade is identified to be highly competitive and not controlled by few traders in both Ogun and Ondo states. Comparatively, the level of competition is higher in Ondo state than in Ogun state.

5. The obstructions to section into granite aggregate business in Ondo and Ogun States is majorly the beginning capital prerequisite which is the major constraint. Result shows that the outcomes, the granite producers in Ondo State required a base working capital of about ₦9million, with a most extreme measure of ₦18million, contrasted with Ogun granite producer with at least ₦5million and a limit of ₦15million.

It is therefore recommended that government and private sector should promote processing which involves making financing facilities available so that the private sector will be encouraged to invest in processing activities, and that government should also provide an incentive to the private sector to continue improving the state of technology processing.

REFERENCES

Bain, J. S. (1968). *Industrial Organization,* John Willey and Son, New York. pp. 71-87.

Bani, B. M. (2017). The Application of Marble and Granite as Building Materials in Jordan. *Jordan Journal of Civil Engineering.* 11, pp. 234-238.

Cramers, G. L., and Jensen, W. (1982). *Agricultural Economics and Agribusiness,* 2nd Edition. McGraw Hill Book Company, USA.

Federal Bureau of Statistics (2004) *Poverty Profile.*http://www.nigerianstat.gov.ng/connection/poverty/povertyprofile2004.pdf, (Accessed 20April, 2018)

Funke, O., Raphel, B & Kabir, S. (2012). Market Structure, Conduct and Performance of Gari Processing Industry in South Western Nigeria, *In European Journal of Business and Management,* 4, Issue 2, pp.10-18.

Hakobyan, N. (2004). Evolving marketing channels in Armenia: A Structure-Conduct Performance. Paper presented for poster presentation at the *14th Annual IMAMA World Food Agribusiness Symposium in Monteux, Switzerland, Monteux,* Switzerland, pp.12-15.

Harriss, B. (1993). There is Method in My Madness or is it vice versa? Measuring Agricultural Performance in Agricultural and Food Marketing in Developing Countries. In John Abbot (Ed.): Agricultural and Food Marketing in Developing Countries. Trowbridge Wittshire: Redwood Book Limited; pp. 34- 40.

Kohl's, R.L. & Uhl, J.N. (1985). *Marketing of Agricultural Product,* 5th ed., Coiler Mac, Milan, U.S.A

Kothari, C.R. (2004). Research Methodology Methods & Techniques2nd ed., New Delhi, India. New Age International (P) Limited.

Schmalensee, R. (1989), "Inter-industry Studies of Structure and Performance." R. Schmalensee and R. Williq eds. *Handbook of Industrial Organization.* Amsterdam: North Holland: 591-1009.

Tadesse, T. (2011). Foreign Aid and Economic Growth in Ethiopia: A Cointegration Analysis, *Economic Research Guardian.* (2) pp. 88-108.

Kothari, C.R. (2004) *Research Methodology Methods & Techniques* 2nd ed., New Delhi, India. New Age International (P) Limited.

Odunaike, R.K., Ozebo, V.C., Alausa S.K. & Alausa I.M. (2008). Radiation Exposure to Workers and Villagers in and around some Quarry Sites in Ogun State, Nigeria. Environ. Res. J, 6, pp.348-350.

Wolday, A. (1994). Food and Grain Marketing Development in Ethiopia, after the market reform of 1990: A case study of AlabaSiraro District. Koster Publisher, Berlin.