

## Economic Assessment of Granite Quarrying in Oyo State, Nigeria

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**Abstract:** For centuries, the mining industry has been contributing to the development of nations, a vibrant mining sector like any other sector provides good platform for a country's growth. Quarrying, a branch of mining is one of the bedrock of the construction sector in any economy. This study examines the economic contribution of granite quarrying in Oyo State, South-Western Nigeria. Fourteen granite quarrying companies exist in the state, out of which twelve are operational. The twelve quarries were visited in the course of this study and relevant data were gathered from them. All the companies share a total of  $220.7 \times 10^6$  tons of proven granite reserve. Estimated revenue generated by the federal government is ₦500,000 day<sup>-1</sup>. A total of 845 people are directly employed by the quarries, while 1018 people are employed indirectly in the company's community. The study also revealed a substantial increase in the level of income of the indirect employees after relocating to their businesses to the company's community. It was equally discovered that 80% of the granite produced in the state is sold and used in Lagos state (a neighbouring state). Granite quarrying in Oyo state is very profitable and rewarding for investors but government should improve power supply to encourage investors and reduce the cost of operating the quarries.

**Key words:** Granite, quarrying, economic assessment, direct employees, indirect employees

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### INTRODUCTION

Mining may well have been the second of man's earliest endeavours, granted that agriculture was the first (Hartman and Mutmanský, 2002). The two certainly rank together as the primary or basic industries of human civilization. Here the term mining is used in its broadest context as encompassing the extraction of all naturally occurring mineral substances, which may be solid, liquid or gas for the essential needs of man. Granite, which falls under the category of igneous rock is a non metallic mineral. Granite possesses some characteristics that make it useful for many purposes in construction industries. Granite aggregate is also known as construction mineral.

For many years, mineral exploitation has supported the socio-economic development of many countries (Akande and Idris, 2005). A vibrant mining sector tends to generate large fiscal incomes, relative to other sectors. In developing world, it will continue to provide the technological development and employment. In Africa, particularly in some Southern Africa Development Community (SADC) countries, mining has contributed over 90% of all foreign earnings, 60% of gross national product, 50% of total government revenue and 30% of total employment (Imasiku, 2008). Pitifully, the over-dependence of Nigeria on the oil sector has left the solid minerals sector in a state of derelicts. In the developed countries such as Canada, mining accounts for

approximately 15% of national exported commodities and 4.5% of national GDP and provided highly paid jobs to >34,000 Canadians (Hilson, 2002).

Minerals are considered to be the key to development and foundation upon, which the society is built (Bosson and Benson, 1977). Minerals can be regarded as man's principal physical material in the development of the industrial civilization. It can also be confirmed that minerals have left their very impact on mans development to the extent that the early evolution is traced in terms of mans acquaintance with minerals; the pre-stone age, the stone age, the bronze age, the iron age etc.

It is clear that construction is one of the major sectors that contribute immensely to any development. Building of improved standard buildings, construction of durable and quality roads and bridges had been a signal of development in any economy. Granite quarrying had really helped in this area. In Oyo state, Western Nigeria, there are 14 operating granite quarrying companies out of which two are no longer in operation. This concentration of large number of quarry in the state compared to other states is due to Akande and Idris (2005), its proximity to Lagos State, the commercial center of Nigeria where so much construction is going on (Bosson and Benson, 1977). The non availability of granite deposit in Lagos State. Production of aggregate (crushed rock) is a basic industry of utmost economic importance because the production of aggregate materials are essential

ingredients of concrete, asphalt surfacing, asphalt production and delivered prices are major factors in determining the cost of construction. The strength, durability and moderate specific gravity of granite makes it a suitable rock for aggregate production.

Apart from the construction usefulness of the granite aggregate, granite quarrying had contributed to the economic development in so many areas. Quarrying operation is a labour intensive operation thereby, lots of employment is created coupled with infra structural developments. Quarrying companies also serve as source of revenue to the government in the areas of issuance of mining lease, quarry lease, royalties, explosive permit, blasting certificate and so on. Analysis of these benefits is the focus of this study.

The wide range of mining techniques and mineral production processes can lead to an equally broad array of environmental impacts, particularly in highly sensitive ecosystems like tropical forests (Sweeting and Clark, 2000). Despite the economic benefit of granite quarrying, there are some physical and socio-economic impacts of granite quarrying on the environment. Ground vibration, air pollution, land degradation, water pollution, noise are some of the physical impacts of granite quarrying on

the environment. The socio-economic impact includes; resettlement or provision of different lifestyle to the local community, displacement as a result of pollution or economic survival etc. It is therefore, necessary that every mining company should evaluate comprehensively the environmental impact of its project and adopt appropriate pollution control strategies. The company should also take cognizance of the local environmental laws and where necessary plan their development to allow for least possible detrimental disruption of the ecology of the area.

**The area of study:** The study area is Oyo state, South-Western Nigeria on longitude 3°E and latitude 7°N (Rahaman, 1987). The area ranges in latitude from 150-600 m. Oyo state is part of the savannah ecological zone. The mean annual rainfall from the areas ranges from 1000-1400 mm (40 years record). Most of the rainfall is concentrated between April and October and the wet and dry seasons are well marked. Temperature is high throughout the year with a mean of 27°C. Relative humidity ranges between 60 and 80%. The basement complex rock in the state gives rise to a wide variety of soil. Figure 1 shows the map of Nigeria indicating the study area, Oyo state, Nigeria.

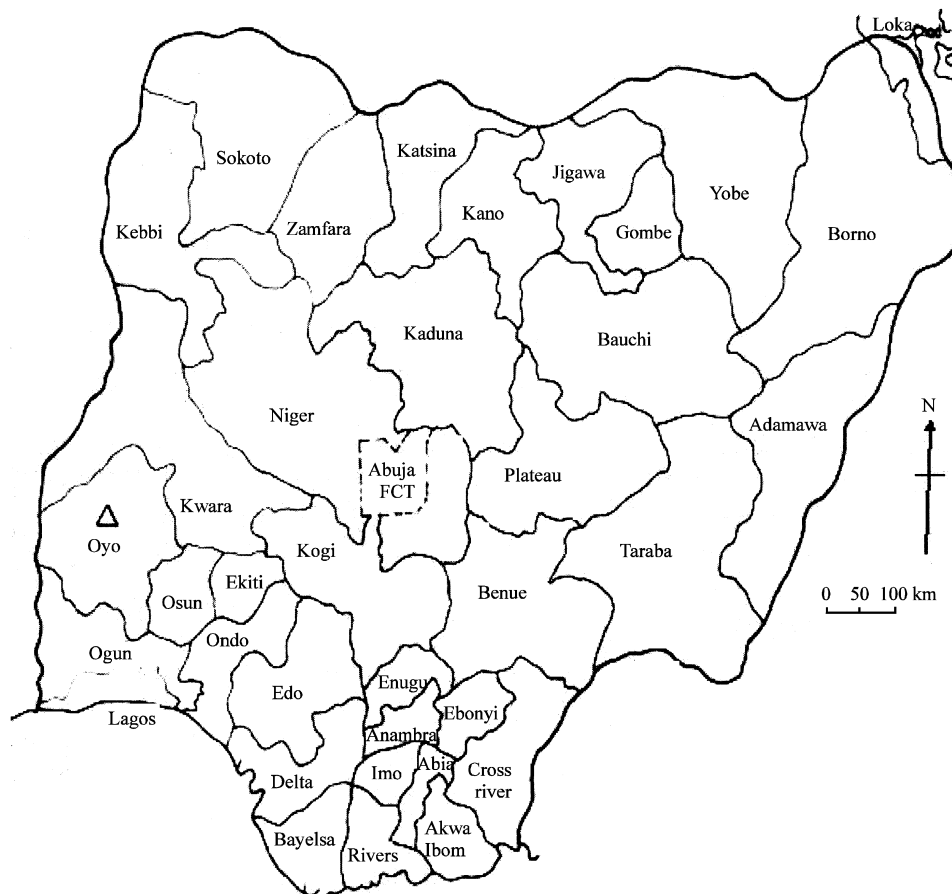


Fig. 1: Map of Nigeria showing Oyo state

## MATERIALS AND METHODS

**Data collection:** There are 14 granite quarries in Oyo state, out of which 12 are in operation. The twelve operating quarries were visited and necessary information was obtained from their records.

Questionnaires were distributed to the companies to get necessary data such as production rate, staff capacity with their average salary, estimated life of the deposit, estimated reserve and so on. Questionnaires were also administered to the indirect employees (food vendors, drivers, mechanics etc.) to obtain information on the impact of the quarries on their economy. The federal ministry of solid minerals development was equally visited to collect data about the royalties paid by the operating granite quarrying companies.

**Data analysis:** Data obtained from the questionnaires were critically analyzed and subjected to statistical analysis using simple statistical tools such bar chart (multiple and component bar chart) and pie chart.

## RESULTS AND DISCUSSION

### Distribution of indirect employees respondent

**Market distribution:** There are twelve operating granite quarries in the state with a total estimated proven reserve of  $220.7 \times 10^6$  tons (Table 1). The production rate of the companies and the corresponding revenue generated from them by the federal government is shown in Fig. 2. Since royalty is based on production rate (tons day<sup>-1</sup>) and assuming that production is constant for the lifespan of the various deposit, the expected revenue that would be generated by the government per day from royalty (₦40 ton<sup>-1</sup>) is ₦500,000.

Figure 3 shows the distribution of direct employees in the various companies. The number of management staff, engineers, technicians and unskilled labour

employed at the companies are indicated. From Table 1, a total of 845 people are employed directly by all the companies and approximately 1018 people are indirectly employed.

Figure 3 and Table 1 show that RATCON has the highest number of staff, 126 in total, while AMIMIKE has the lowest staff strength of 26. Table 2 shows RATCON with the highest number of unskilled labour of 100, while the lowest number of 14 is at AMIMIKE.

**Percentage distribution of indirect employees respondent and basis of their socio economic characteristics:** The indirect employees include the food vendors, drivers, mechanics, phone operators, bar operators and a host of others.

From Fig. 4, 48% of the respondents were earning <₦5,000, 23% were earning between ₦5,000 and ₦10,000, 11% were earning between ₦10,000 and ₦15,000, 10% were earning between ₦15,000 and ₦20,000 and 8% were earning above ₦20,000 before relocating to company's environment. Figure 5 shows that 20% are now earning below ₦5,000, 28% now earns between ₦5,000 and ₦10,000, 24% earns between ₦10,000 and ₦15,000, 15% earns between ₦15,000 and ₦20,000, while 13% earns above ₦20,000 month<sup>-1</sup>. Comparing the income of this group of people, it is evident that there is an increase in their level of income when they relocated to the company's community. This result is well depicted in the bar chart shown in Fig. 6.

Figure 7 indicates that 30% of the respondents are below 20 years, 17% are between 20-30 years, 31% are between 30-40 years, while 22% are above 40 years. From Fig. 8, it is shown that 38% of the respondents are female, while 62% are male.

Figure 9 shows that 29% of the respondents had no formal education, 42% had primary school education, 20% had secondary school education, 7% had post secondary school education, while 2% had adult education.

Table 1: Data collected from the operating companies

Name of company	Estimated reserve 10 <sup>6</sup> ton	Estimated life (years)	Production rate (ton day <sup>-1</sup> ) (r)	No. of direct employees	No. of indirect employees	Expected revenue generated by Govt. per day (40×R)
Wasi	18.7	60	1000	66	57	40000
Ladson	4.7	50	300	81	60	12000
Nama	15.6	50	1000	45	45	40000
Pedgrek	7.8	50	500	66	40	20000
Amimike	4.6	60	250	26	37	10000
Tafotek	16.2	45	1150	45	44	46000
Solel bonel	22.8	43	1700	82	200	68000
Ratcon	14.5	31	1500	126	160	60000
Kopce	46.8	100	1500	103	150	60000
Dekit	21.5	55	1250	50	35	50000
Agi	35.8	75	1600	105	150	64000
Wetip	11.7	50	750	50	40	30000
Total	220.7	-	-	845	1018	₦500000 = \$4167

Source: Field Survey (2006)

**Market availability:** The market research on where various aggregates are being used and sold revealed that 83% of the crushed stone based are used in Lagos mainland, 17% in Lagos Island, while 0% is used in Ibadan and others (Fig. 10).

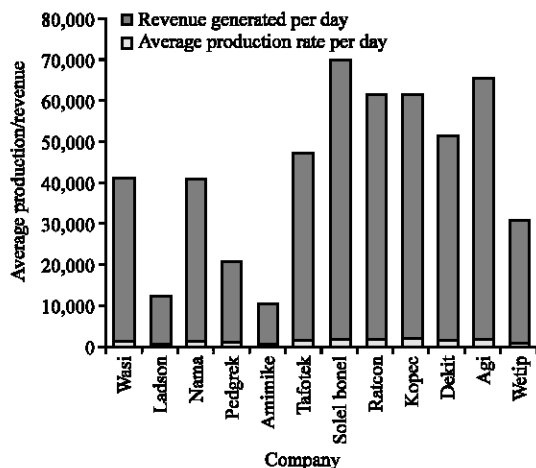


Fig. 2: Average production and average expected revenue (₦) generated by government per day

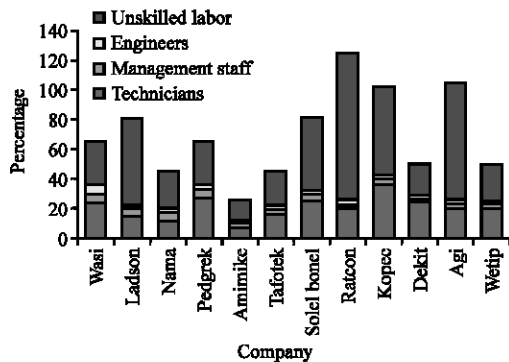


Fig. 3: Comparison of number of unskilled labour, technicians, engineers and management staff

Figure 11 shows that 59% of granite aggregate (3/4" and 1/2") produced by the granite quarries in Oyo state are used in Lagos mainland, 28% in Lagos island, 7% in Ibadan while 6% are used in other places.

From Fig. 12, 13% of quarry dust is used in Lagos Island, 17% in Lagos mainland, 66% in Ibadan with 4% being used in other places. Figure 13 shows the comparison of market distribution for crushed stone based, granite aggregates and stone dust. The results

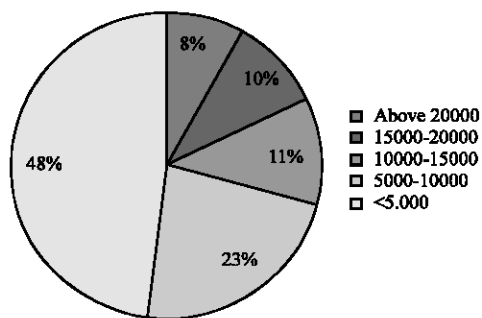


Fig. 4: Distribution of indirect employee's average income per month before relocating to the company's community

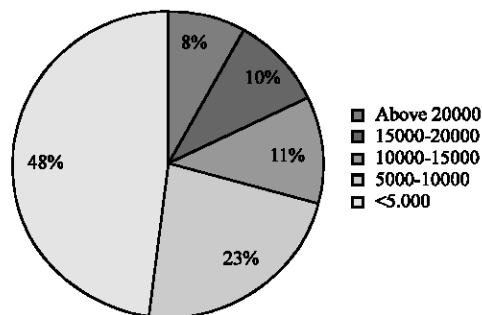


Fig. 5: Distribution of indirect employees respondents average monthly income at present

Table 2: Staff capacity with average salary/head/month (₦)

Name of company	Avg. salary of technicians (₦)	No. of Techn.	Avg. salary of MGT staff (₦)	No. of MGT staff	Avg. salary of engineers (₦)	No. of Engin.	Avg. salary of unskilled staff (₦)	No. of unskilled staff
Wasi	25000	25	45000	5	40000	6	12000	30
Ladson	18000	15	40000	5	40000	3	10000	58
Nama	22000	12	45000	5	40000	3	12000	25
Pedgrek	25000	28	45000	5	40000	3	15000	30
Amimike	20000	7	40000	3	38000	2	10000	14
Tafotek	22000	16	38000	3	38000	3	14000	23
Solel bonel	30000	25	50000	5	35000	2	18000	50
Ratcon	28000	20	55000	3	45000	3	17000	100
Kopec	30000	36	60000	4	50000	3	14000	60
Dekit	20000	24	40000	3	38000	2	12000	21
Agi	28000	20	50000	3	45000	3	17000	79
Wetip	30000	20	45000	3	40000	2	15000	25

Field Survey (2006)

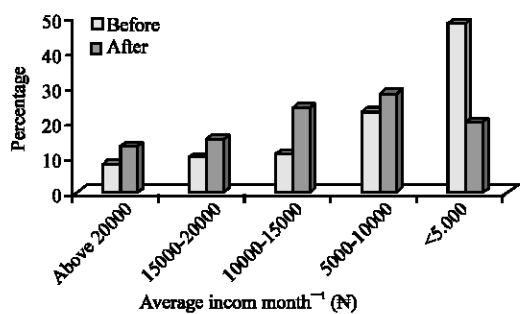


Fig. 6: Comparison of indirect employee's average income per month before and after joining the company's community

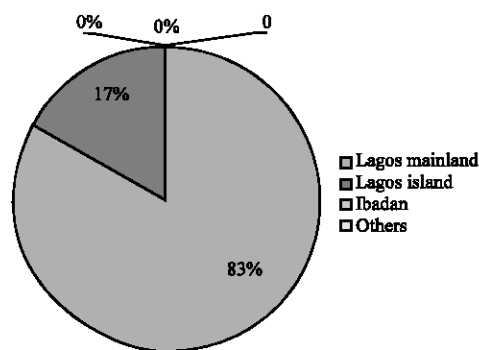


Fig. 10: Market distribution of crushed stone

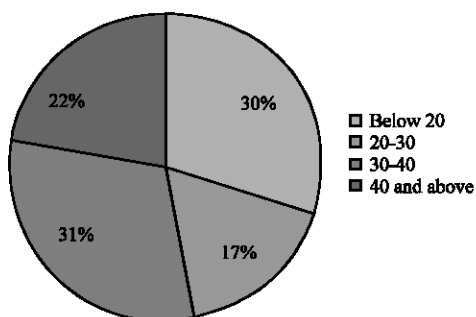


Fig. 7: Distribution of indirect employees by age

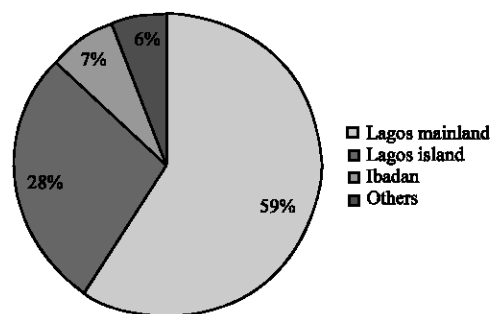


Fig. 11: Market distribution of granite aggregates (3/4\"/>

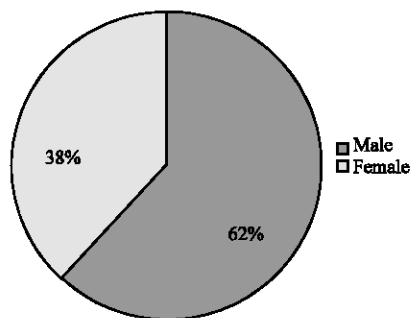


Fig. 8: Distribution of indirect employees by sex

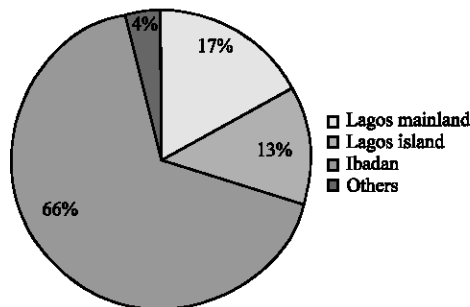


Fig. 12: Market distribution of quarry dust

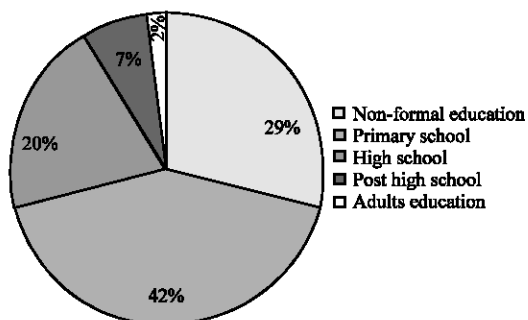


Fig. 9: Distribution of indirect employee's by level of education

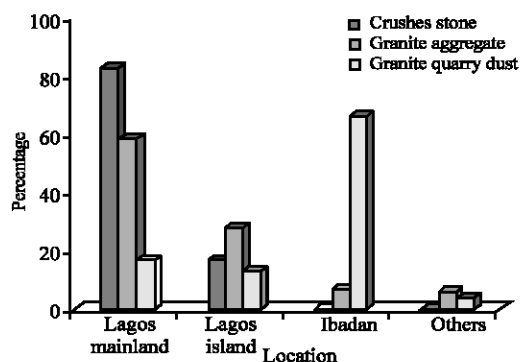


Fig. 13: Comparison of market distribution of crushed stone, granite aggregate and quarry dust

Table 3: Average cost of production and revenue per ton

Company	Average cost of production/ton (₦)	Average revenue/ton (₦)
Wasi	1300.0	1900.0
Ladson	1300.0	2000.0
Nama	1200.0	1900.0
Pedgrek	1200.0	1900.0
Amimike	1200.0	1800.0
Tafotek	1100.0	1850.0
Solel bonel	1200.0	1900.0
Ratcon	1500.0	1900.0
Kopec	1220.0	1900.0
Dekit	1000.0	1800.0
Agi	1200.0	1900.0
Wetip	1250.0	1850.0
Total	14670.0	22600.0
Average	1222.5	1883.3

Field Survey (2006); Average profit =  $1883.3 - 1222.5 = ₦660 \text{ ton}^{-1}$

revealed that Lagos mainland is largest market for crushed stone and granite aggregate while the largest market for quarry dust is Ibadan.

From Table 3, it costs an average of ₦1,222.50 to produce a ton of granite aggregate, with average revenue of ₦1,883.8  $\text{ton}^{-1}$ . This gives an average profit of ₦660  $\text{ton}^{-1}$ .

### CONCLUSION

Quarrying in Oyo state is big source of revenue the federal government. The average expected revenue to be generated from the granite quarrying companies in the state is ₦500,000  $\text{day}^{-1}$  based on the level of production per day. An estimated 845 people are directly employed by the companies while 1018 people are indirectly employed. Thus, these companies are contributing greatly to employment generation in the state. Granite quarrying in Oyo state has also increased the income level of the indirect employees, hence improve their economic situations.

The high potentials of granite quarrying in Oyo state is due to its proximity to Lagos state, the commercial nerve center of Nigeria, where serious construction work is on a daily basis. Market availability analysis indicates that over 80% of granite aggregates produced in Oyo state is used in Lagos Island and mainland. This can be attributed to the non availability of granite deposit in the state. Granite quarrying is a profitable venture in Oyo state, Nigeria as an average profit of ₦660 is made per ton.

### RECOMMENDATIONS

Quarrying in Oyo state is a very profitable venture, this is evident by the concentration of quarries in the

state. Majority of the quarries in the state are located along Lagos-Ibadan expressway because of the easy access to the highway and proximity to Lagos State. Quarrying in the state would be more profitable to both the operator and the government with stable power supply from the government; the quarrying companies generate their own power through diesel-powered generators thus increasing operating cost. With low operating cost, more employment would be generated. Local and foreign investors are encouraged to consider investing in this sector as it provides a good return on investment with a readily available market.

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