Journal of Engineering and Engineering Technology

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Journal of Engineering and Engineering Technology

Economic Appraisal of Some Selected Quarries Operation in Ondo State, Nigeria

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A B S T R A C T

Key words:
Economic appraisal,
Quarry operation

This study examines the economic assessment of some selected quarries operations in Ondo State, South-Western Nigeria. Ten quarries were visited in the course of this study and relevant data were collected using a well-structured questionnaire. All the companies share a total of 15.89×10^6 tons of estimated granite reserve. Estimated royalties generated by the Federal Government is N364,440 day-1. A total of 272 people are directly employed by the quarries, while 116 people are employed indirectly in the companies' communities. The study also revealed the effectiveness of each selected company based on their production and the profitability of each company. It was also found out that quarry operations in Ondo State are very profitable and rewarding for investors but government should improve power supply to encourage investors and reduce the cost of operating the quarries.

1. Introduction

Mining may well have been the second of man's earliest endeavours, granted that agriculture was the first (Hartman, 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 is the main product of all the selected quarries in Ondo State 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 less than 34,000 Canadians (Hilson, 2002). With the evolution of civilization, democratization and the development of industrial economy, there has been an increase in construction works and building activities, which has translated into a rising increase in the demand for construction materials (crushed stones, dimension stones and aggregates). This increase in demand, has also led to the influx of a high number of investors into quarry operations. For a good quarry development, proper planning and careful consideration should be given to all aspects for a systematic and unified approach to ensure the quarry runs efficiently and is economically managed. Quarry operation is a multi-million dollar business and is characterized by certain pre-production and production challenges not generally typical of most other business undertakings. Hence adequate and proper assessment is essential before start-up of quarry operation, a proper plan at the start up of a quarry is important in building and running of a financially viable and profitable quarry. A partial or total disregard for quarry challenges will lead to serious financial losses and eventual failure

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and closure of quarry.

Apart from the construction usefulness of the granite aggregate, quarry operation 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, explosive storage facilities and so on. Analysis of these benefits is the focus of this study.

The wide range of quarry techniques and aggregate 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 quarry operation, there are some physical and socio-economic impacts of quarry operation on the environment. Ground vibration, air pollution, land degradation, water pollution, noise are some of the physical impacts of quarry operation 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.

1.1 Geology of Ondo State

According to Nigeria Physical Setting (2003), there are two distinct geological regions in Ondo State located in the Western Nigeria. First, is the region of sedimentary rocks in the south, and secondly, the region of Precambrian Basement Complex rocks in the north, some few kilometres of Aaye occurs the basement complex sedimentary rocks boundary. The sedimentary rocks are mainly of the post cretaceous sediments and the Cretaceous Abeokuta Formation. The basement complex is mainly of the medium grained gneisses. These are strongly foliated rocks frequently occurring as outcrops. On the surface of these outcrops, severely contorted, alternating bands of dark and light colour

2   Methodology

2.1   Data Collection

Primary data was used for this study. The primary data was obtained through the use of structured questionnaires which were administered to quarry managers. Data collected were on each reserved [estimated reserved], their lifespan, the total quantities of aggregate produced by each selected quarries from year 2010 to 2014, total quantities of aggregates sold or used for construction works and building of structure by each selected companies from 2010 to 2014, number of workers employed and their wages and salaries and total revenue generated from each companies by government.

2.2   Data Analytical Technique

The use of tables and charts was mainly used in presenting the result of the data analysis following each objective of the study.

3.   Results and Discussions

Table 1: Estimated Reserved, Production Rate and Expected Royalty of Each Quarry Companies of Study.

Table 1: Estimated Reserved, Production Rate and Expected Royalty of Each Quarry Companies of Study

Companies	Estimated reserved (tons)	Estimated lifespan (years)	Production rate (ton/day)	Expected royalty (₦/day)
Ond 1	2,180,000	20	350	14,000
Ond 2	1,570,000	18	280	11,200
Ond 3	2,370,000	19	400	16,000
Ond 4	940,000	20	150	6,000
Ond 5	1,440,000	21	220	8,800
Ond 6	1,690,000	18	300	12,000
Ond 7	3,900,000	25	500	20,000
Ond 8	2,184,000	25	280	11,200
Ond 9	940,000	30	150	6,000
Ond 10	110,000	17	250	10,000
Total	17,324,000	-	-	115,200

Table 2: Total Productions, Sold/Used Aggregates, Expenditure, Royalties and Revenue
Generated by Quarry Companies of Study across Five Years (2010 – 2014)

Companies	Period (years)	Total production (tons)	Total sold/used aggr. (tons)	Total expenditure (₦)	Royalty paid to govt (₦)	Revenue generated by companies (₦)
Ond 1	5	653,120	575,777	593,340,000	23,028,680	1,632,007,600
Ond 2	5	439,920	214,700	260,490,500	8,588,010	601,160,000
Ond 3	3	218,309	197,056	112,999,000	7,882,200	551,754,000
Ond 4	5	156,806	78,926	113,146,000	3,157,010	220,990,700
Ond 5	5	332,640	129,188	136,755,350	5,167,107	361,725,490
Ond 6	4	291,160	85,298	103,028,000	3,412,005	238,837,200
Ond 7	3	265,200	124,624	139,050,520	4,984,971	348,947,200
Ond 8	5	147,160	61,213	70,120,500	2,448,500	159,152,000
Ond 9	5	298,520	162,269	155,980,050	6,490,770	454,381,800
Ond 10	5	312,000	47,890	80,400,100	1,915,732	134,101,240

Table 3: Staff Capacity with Mean Salaries/ Head/ Month and Number of Staff.
Quarry Companies of Study in 2014

	Mean Salary of Technical Staff (₦)	Numb. of Technical staff	Mean Salary of Mgt Staff (₦)	Numb. of Mgt Staff	Mean Salary of Engineer (₦)	Numb. of Engrs	Mean Salary of unskilled Staff (₦)	Numb. of unskilled staff
Ond 1	80,000	40	75,000	8	100,000	4	30,000	15
Ond 2	43,000	16	47,000	4	51,000	2	21,000	12
Ond 3	50,000	18	85,000	7	90,000	5	25,000	20
Ond 4	45,000	17	52,000	5	47,000	3	25,000	11
Ond 5	52,000	14	58,000	3	100,000	3	28,000	16
Ond 6	62,000	37	63,000	12	70,000	3	29,000	8
Ond 7	42,000	13	49,000	3	40,000	1	15,000	11
Ond 8	46,500	21	50,000	4	48,000	2	27,000	12
Ond 9	40,000	11	63,0004	4	45,000	2	22,000	12
Ond 10	42,000	13	49,000	3	40,000	1	15,000	11

Table 4: Total Productions of Quarry Companies of Study between 2010 and 2014

Companies	2010	2011	2012	2013	2014	Total
Ond 1	19,800	23,760	27,040	36,960	39,600	147,160
Ond 2	46,080	51,840	8,060	94,620	97,920	298,520
Ond 3	71,760	78,000	87,360	93,600	109,200	439,920
Ond 4	63,360	57,600	69,120	70,560	72,000	332,640
Ond 5	-	-	78,000	87,360	99,840	265,200
Ond 6	-	-	52,400	68,500	97,409	218,309
Ond 7	130,000	116,000	88,920	161,000	157,200	653,120
Ond 8	46,800	56,160	62,400	68,640	78,000	312,000
Ond 9	-	56,160	62,400	78,000	93,600	291,160
Ond 10	27,986	28,560	33,200	32,500	34,560	156,806

Table 4 above presents the total productions across the years of production, this is used to assess and evaluate the effectiveness of each company. It was found that Ond 7 had the highest production across the years while Ond 1 had the lowest production.
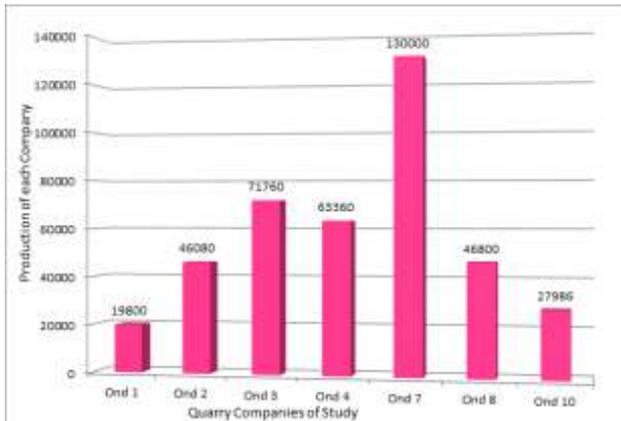
Figure 1: Mean Production of Companies of Study in 2010
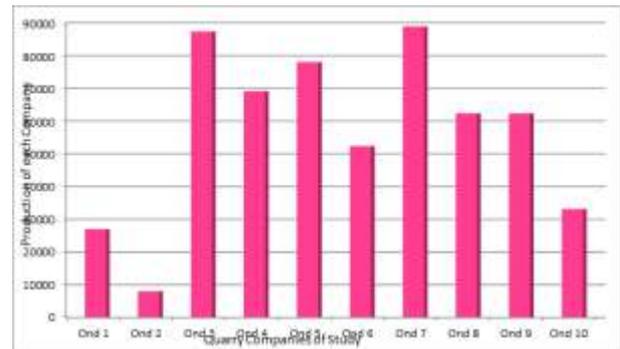
Figure 3: Mean Production of Companies of Study in 2012
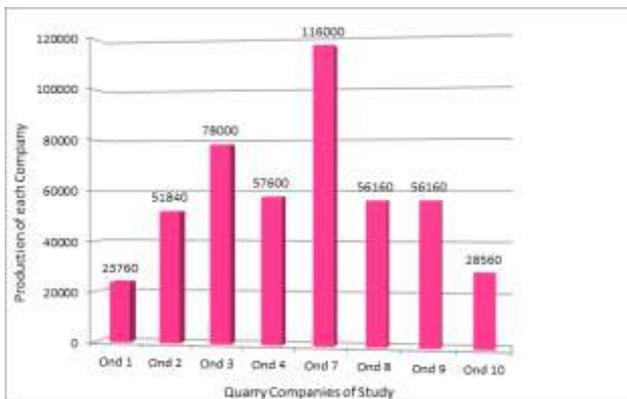
Figure 2: Mean Production of Companies of Study in 2011
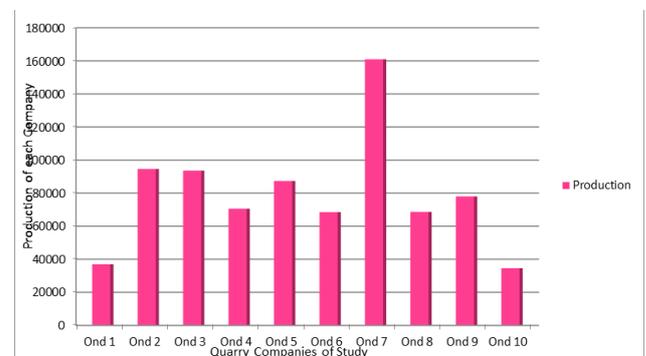
Figure 4: Mean Production of Companies of Study in 2013

Table 5 above presents the expenditure, revenue and profit of Companies of study for 2014. The profit generated by companies in 2014 was used to compute and assess the profitability of each company based on inconsistence of some companies in 2010 and 2011.

The charts showing the representation of the total revenue, expenditure and profit for 2014 are showing below.

Tables 6a and 6b above show the profit generated by each selected companies across the five years i.e. 2010 to 2014.

Table 5: Expenditure, Revenue and Profit of Companies of Study (2014)

Companies	Total Expenditure (₦)	Total Revenue (₦)	Profit (₦)
Ond 1	22,900,050	53,950,000	31,049,500
Ond 2	58,675,300	197,330,000	138,654,700
Ond 3	61,250,000	162,498,000	101,248,000
Ond 4	41,980,350	123,487,490	81,507,140
Ond 5	53,200,400	147,134,400	93,934,000
Ond 6	45,825,000	316,589,000	270,764,000
Ond 7	146,500,000	393,456,000	246,956,000
Ond 8	14,000,000	134,101,214	7,000,000
Ond 9	34,500,000	238,837,200	60,000,000
Ond 10	113,146,000	220,990,700	27,504,000
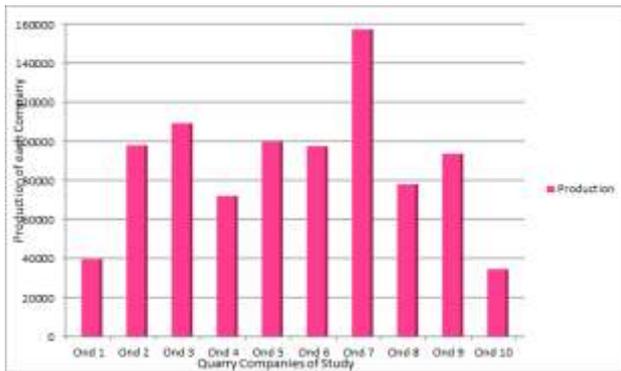
Figure 5: Mean Production in 2014
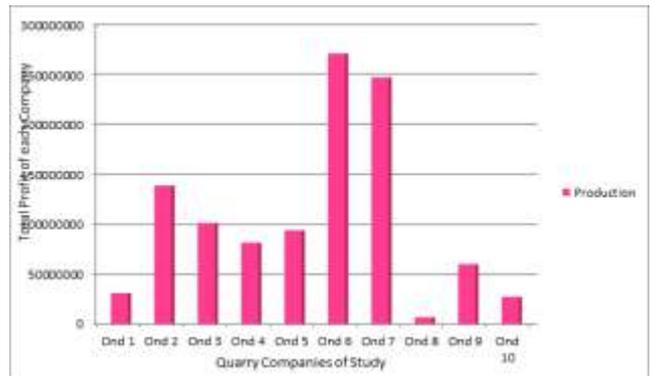
Figure 6: Total Profit of Companies in 2014

Table 6a: Profit Generated by each Company across 2010 to 2014

	Profit (2010) (₦)	Profit (2011) (₦)	Profit (2012) (₦)	Profit (2013) (₦)	Profit (2014) (₦)
Ond 1	5,315,000	13,065,000	10,705,000	28,897,000	31,049,500
Ond 2	22,712,950	30,345,500	912,000	97,563,600	138,654,700
Ond 3	24,051,500	60,280,000	52,410,000	102,680,000	101,248,000
Ond 4	18,190,000	21,320,000	30,030,000	73,915,000	81,507,140
Ond 5	-	-	53,849,480	61,593,200	93,934,000

Table 6b: Profit generated by each company across 2010 to 2014

	Profit (2010) (₦)	Profit (2011) (₦)	Profit (2012) (₦)	Profit (2013) (₦)	Profit (2014) (₦)
Ond 6	-	-	47,658,000	120,333,000	270,764,000
Ond 7	117,380,000	163,426,000	141,725,600	255,900,000	246,956,000
Ond 8	3,792,400	22,268,840	13,640,000	7,000,000	7,000,000
Ond 9	-	7,456,600	16,177,600	52,175,000	60,000,000
Ond 10	18,616,800	19,600,900	21,165,000	209,50,000	27,504,000
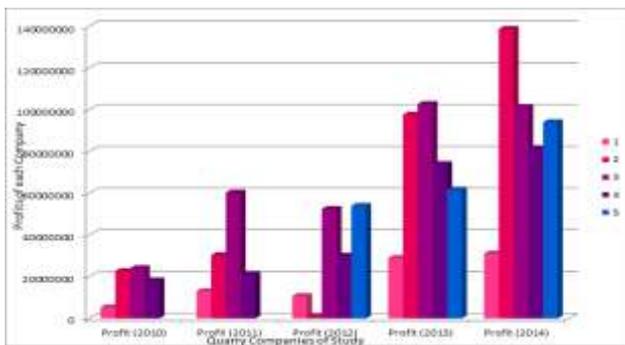
Figure 6a: Profit Generated by each Company between 2012 and 2014
1. = Ond 1   2. = Ond 2   3. = Ond 3   4. = Ond 4   5. = Ond 5
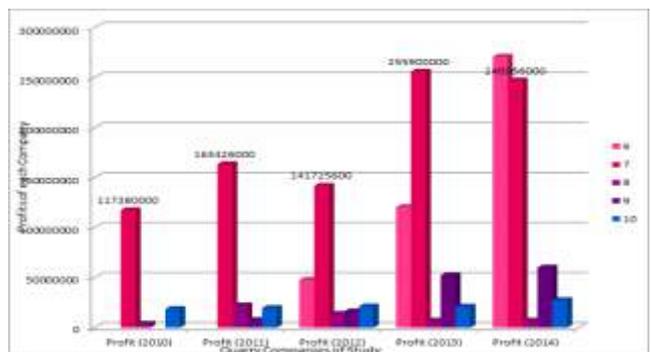

Figure 6a: Profit Generated by each Company between 2012 and 2014
6. = Ond 6   7. = Ond 7   8. = Ond 8   9. = Ond 9   10. = Ond 10

It was also analyzed that all the companies generated profit throughout the study years, no company runs into debt but profit generated by each company varies depending on company input like initial capital, availability of equipments, enough capital for its smooth running and workforce etc.

Royalty paid to government on aggregates used /sold had significant effect on profit at 10%

Table 7: Determinants of Profitability among Quarry Companies of Study in 2014

Model	B	Std. Error	T	Sig.
(Constant)	-5.616E7	8.349E7	-0.673	0.531
Number Staffs employed (X_1)	-33106.604	3618901.747	-0.009	0.993
Royalty*(X_2)	48.176	19.439	2.478	0.056
Estimated reserves (X_3)	28.081	48.901	0.574	0.591
production rate per day (X_4)	-73590.015	468428.629	-0.157	0.881

Linear Regression Model is given by:

$$Y = a_0 + a_1X_1 + a_2X_2 + a_3X_3 + a_3X_3 + a_4X_4 + e \ldots \ldots \ldots \ldots (I)$$

Y = Dependable variable which is Profit in 2014
a_0 to a_4 = Regression estimates

$R^2 = 0.824$
Adj. $R^2 = 0.678$
$F = 2.637$
Significance ($p - value$) $= 0.058$

The adjusted R^2 (= 0.678) indicate that the independent variables i.e. number of staffs employed, royalty paid to government, estimated reserve and the production rate per day determine 67.8% variations in the profit made by an average company in Ondo State, though significant at 10% ($p < 0.10$). Royalty paid to government was however observed to have a significant effect on the profit generated by each company at 10%. The result show that royalty paid to government and estimated reserves were positively related to the profit of the company therefore if government increase royalty paid on aggregates sold or used, the company profit will increase by N48.18K also if estimated reserved increase by 1ton, profit of company also increase by N28.08K.

Profit decrease by N33,106.60k if an additional staff/day is employed likewise profit decrease by N73,590.02k if the production rate per day increases.

4.   Conclusion and Recommendation
The economic assessment of quarry operation of some selected quarries in Ondo State reveals that quarry operation is a profitable venture. They contribute immensely to the growth and economic development of the communities in which they were sited and entire country.

Quarries operations also serve as source of employment for people thereby reduce the number of unemployed people in the country, 272 direct employees and 116 indirect employees were employed by the selected companies in 2014.

The revenue generated by government through the companies royalties also boost IGR of the country, about 364,440.00 was generated by government per day in 2014 though it has significant effect on the profit of the company.

The independent variables i.e. number of staffs employed, royalty paid to government, estimated reserve and the production rate per day determine 67.8% variations in the profit made by an average company in Ondo State, though not significant ($p > 0.05$).

This work has shown that quarry operation is a viable business but it is capital intensive. The following recommendations were therefore made:

1.   It is recommended that Government should give supportive hand to finance quarry operation, since it will help to improve and develop the economy of the country and reduce the unemployment rate.

2.   The enact law guiding the operation of quarry operation should be strictly followed.

3.   Introduction of other government agencies like SSS and anti-bomb squad into quarry operation which contradict Nigerian Mineral and Mining act, 2007 and Mining regulation. 2011 and also has negative effect on the production cost of the company, should be reversed.

4.   Interest rate on loans from banks should be reduced to nearest minimal.

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