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An Assessment of Gender Mix of Manpower in Granite Artisanal and Small Scale Mining, Southwest Nigeria

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Abstract

This study focuses on evaluating granite Artisanal and Small Scale Mining (ASM), women miner contribution, and the possibility of viable development particularly in Nigeria. A review of literature on global ASM practice, and issues from the social point of view was carried out to identify the links to the woman miner. Afterwards, search for granite ASM sites was conducted. Study sites where data were collected were mostly in the South West and comprised 34 sites. Gender distribution in the entire operation stages was captured for each mine using nominal binary responses: "n"- none; "y" – yes for either "M" – male or "F" female. These responses were counted and graphed for the sample population using "COUNTIF" function and chart tool of EXCEL spreadsheet. Further, from the data, granite ASM condition in the South West of Nigeria were characterized using graphical and numerical statistical techniques, rating scale development technique,. Results shows in literature review suggested a high women participation in ASM and highlighted socio-economic issues only. The next shows the characterization of granite ASM by statistical analysis of raw data, established that the female gender population is about 80% of manpower, and 15% in entrepreneurial roles. Government should encourage ASM as a means of poverty alleviation by facilitating credits that can be used to improve ASM conditions and practice. Especially, as it is seen that ASM is an avenue for many women to be gainfully employed.

Keywords: Mining Operation, gender distribution, gender productivity, granite artisanal and small scale mining, Nigeria.

1. Introduction

The products of the mining industry have become very essential primary ingredients in almost everything used in modern times but the human costs component of their production has not been adequately taken into consideration for proper assessment of the justification of exploitation and patronage. Many mineral driven economies have the worst indices of human development. The female gender pays the highest price of human degradation for the extraction and use of minerals and metals. The valuation of the world's minerals does not take into account these invisible human costs and subsidies especially that women pay. (D'Souza, 2004).

However, the involvement of women in the production of minerals for global consumption is very high, particularly through ASM. The returns for engaging in ASM for women, besides the general meager wages in cash, are very low. The costs in terms of social amenities, sexual harassments, labour insecurity, and inaccessibility to finance, health hazards and marginalization are often not taken into consideration. Therefore, any study on involvement of Women in ASM is relevant.

Mostly, attention is focused on large companies, but in many parts of the world, particularly in developing countries, minerals are extracted by ASM, which is carried out by people working with simple tools and equipment, usually this is an informal sector, outside the legal and regulatory framework. The vast majority of ASM miners are very poor, exploiting marginal deposits in harsh and often dangerous conditions – and with considerable impact on the environment. ASM is a livelihood strategy adopted primarily in rural areas. In many cases, mining represents the most promising, if not the only, income opportunity available. (International Labour Organization, 1999).

ASM activities will continue for at least as long as poverty persists without alternative means of livelihood. In addition, the rights of individuals, more so, women, to secure livelihood through ASM must be respected, as must the objectives of meeting basic needs and maximizing economic wellbeing and financial freedom. It is therefore essential that efforts be made to maximize the benefits brought by small-scale mining and to avoid or mitigate the costs. Constraints to achieving this in ASM include poor access to finance and a lack of collective capacity, particularly for individual or household level Artisanal mining operations. (International Labour Organization, 1999)

The field study location is within the Southwest basement complex of Nigeria. It is expected that the results obtained in the case study location can be extended to other parts of the basement complex for the same mineral.

Artisanal mining in Nigeria appears to be a direct consequence of widespread poverty, caused by the decline of mining industry in Nigeria since the 1970's; dwindling oil revenue following the eventual fall in the price of crude oil in international market; and the introduction of Structural Adjustment Programme (SAP) in Nigeria in

the 1980s. Today ASM dominates the current Nigeria mining sector, and over 90% of mining activities are illegal.

Nigeria is very rich in economic minerals mineable through ASM. The population is about 150 million, over 40% of which are women (the highest in Africa). About 50% of the women population reside or obtain their livelihood in the rural areas. Women participation in ASM can be commonly observed all over Nigeria (visually; author's visual survey, personal communication with entrepreneurs and construction minerals suppliers). Taking analogy of ASM operations in other developed countries of the world and in Africa, it is expedient and necessary to analyze ASM mining conditions and involvement of women miners in Nigeria with a view to developing recommendations for improved and increased participation of women for economic development and standardization of operation. Minerals mined through ASM in Nigeria include: Barites; Limestone; Clay; Granite; Marble; Quartzite; Silica sand; and Tantalite (Ministry of Solid Minerals Development, MSMD, 2002; MMSD, 1999).

The practice and sustenance of ASM has been observed to depend on significant female-gender participation. Women miners in ASM are not accorded the benefit and recognition they deserve for their participation in mineral production in the ASM sector. Moreover, developing countries as Nigeria, rich in ASM minerals, has not been sufficiently assessed not to mention the contribution of women involvement, possible development and legalization for job creation, poverty eradication, fashioning of policies for protecting and improving the participation of the woman-miner; numerical contribution of women miners in ASM production has never been empirically analyzed..

Government agencies willing to explore ASM for poverty alleviation require empirically based assessments of the techno-economic characteristics of specific mineral ASM operations, in order to determine effective policies needed for supporting ASM and female gender involvement.

Solutions to these problems require an assessment and evaluation of ASM operations of specific mineral, women miner population and impact on production, issues or constraints (technological etc), prospects of development and viability on investment.

2 Materials and Method

2.1 Study Locations

The main study area is the Southwest basement rock complex of Nigeria. This area is assumed as a cluster of granite ASM sites of which an exact count is difficult. The ones located were discovered by making enquiries and speculative searching (scouting). The locations of the sites from which data were obtained are indicated on the geographical map of the country as shown in Figure **1**. The sites are located on the outskirts of towns. Some sites are shown in Plates 1 and 2

2.2 Gender Distribution in Mining Process

For all the mines, granite mining process was defined. Gender distribution in the entire operation stages was captured for each mine using nominal binary responses: "n"- none; "y" – yes for either "M" – male or "F" female. These responses were counted and graphed for the sample population using "COUNTIF" function and chart tool of EXCEL spreadsheet as shown in Figure 2:

Drilling and blasting operations involve fragmenting large rock mass into sizes (about 50.8 cm) conducive for crackers. The blaster-men are a special independent group hired when needed by a particular site. They are not regular workers on a particular site. Heating method of fragmentation is employed in sites with small boulders. Loading is done by the labourers of marketers who come to buy the products; they are independent as well from the site management.

2.3 Gender Head Counts of Managers and Crackers in Sample Population

For each site of the sample population, the gender and number of manager/entrepreneur as well as the number of men and women crackers (Lm, Lw) were recorded. Two coefficients were introduced in the process to reflect the gender ratio: male coefficient of manpower - Km, and female coefficient of manpower – Kw, per unit. These data are summarized using graphical and numerical statistical techniques as presented.

3. RESULT AND DISCUSSION

3.1 Mining Operation Stages and Gender Distribution

The counts of binary observations ("y", "n") of gender (CBOOG) in the production stages for the sample population is charted as presented in Figure 2:

Figure 2 shows that drilling and blasting/heating is done only by the male gender; the cracking of rocks to gravel is carried out by both men and women; measurement, loading is carried out predominantly by men. However, loading is the responsibility of independent marketers.

Data on entrepreneurial roles and gender distribution, Mgr(m) and Mgr(w), show percentage gender observations of 85% and 15% respectively (as in Table 1). Currently the involvement of men predominates in this area.

Women could be encouraged to increase engagement in entrepreneurial roles and not just as hired crackers.

3.2 Gender Coefficients of Manpower

In histograms of Km and Kw presented in Figure 3 and Figure 4, Km ranged from 10-100%, while Kw ranged from 0-90%; Km is positively skewed, while Kw is negatively skewed. The most frequent range of male-crackers per site in the sample granite gravel ASM population is quite low – 15% to 20% of manpower, that of the female gender is higher – 60% to 90% of manpower.

Figure 5 shows that occurrences of manpower (M) vary; M is a variable in ASM. M can vary widely. There are cases that are as high as 45 to 50 crackers in a site, and can be as low as 5 to 15 crackers. Most sites in the sample population have between 5 and 10 crackers.

Measures of Central tendencies

Table 1 shows that the mode, median and average of Km are 20%, 34%, and 40% of manpower respectively; and that for Kw are 80%, 71%, and 66% of manpower respectively.

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Measure of Variability

Further, Table 1 shows that coefficient of variation (COV) of Km is 66% and for Kw – 44%. These values show very high variability of Km and relatively lower variability for Kw.

Measure of Most likely Occurrence

Using the relative frequency approach (as in Figure 6 and Figure 7), the P(Km=20%) and P(Kw=76-90%) are the highest (18% and 39% respectively). The mode of the modal range for Km is 20%, while that of Kw is 80%. P(Km) is positively skewed (i.e, skewed to the left); P(Km= 100%) by relative standing is unlikely. P(Kw) is negatively skewed (i.e, skewed to the right); P(Km<=1%) by relative standing is unlikely.

From the above analysis, it is established that the variability of observations in the sample population is high. However, some values have significantly high relative occurrences. As a result, and based on the relative frequency approach, the estimates of Km and Kw can be taken as 20% and 80% of manpower respectively, which are the respective modes of their modal ranges.

3.3 Gender Gravel production/Cracking rate (Histogram)

The histograms of the gender gravel production rates are presented in Figure 8 and Figure 9. Pm is negatively skewed, while Pw is positively skewed. The most frequent values for Pm are between 19 to 21 hdp per day. The most frequent values for Pw are between 9 to 11 hdp per day. Further narrowing of the Bin intervals narrows the most frequent Pm to approximately 1 tpd and Pw to approximately 0.5 tpd (Figure 10 and Figure 11). The cracking capacity of men is about twice that of women.

4. CONCLUSION AND RECOMMENDATION

From an analysis of the results, the following conclusions can be made:

1. On mining operation stages and Gender Distribution, results show that drilling and blasting/heating is done only by the male gender; the cracking of rocks to gravel is carried out by both men and women; measurement, loading is carried out predominantly by men. It was noted that loading is the responsibility of independent marketers.
2. On entrepreneurial roles and gender distribution, Mgr(m) and Mgr(w), results show percentage gender observations of 85% and 15% respectively. Currently the involvement of men predominates in this area. Locations as Abeokuta have more women at this level than others. Women could be encouraged to increase engagement in entrepreneurial roles and not just as hired crackers.
3. On Gender coefficients of Manpower (Km and Kw), the most frequent range of male-crackers per site in granite gravel ASM is quite low – 15% to 20% of manpower, that of the female gender is the highest – 60% to 90% of manpower. Considering central tendencies, the mode, median and average statistics of Km are 20%, 34%, and 40% of manpower respectively; and that for Kw are 80%, 66%, and 60% of manpower respectively. Considering Variability, the coefficient of variation (COV) of Km is 66% and for Kw – 44%. These values show very high variability of Km and relatively lower variability for Kw. On the most likely occurring values, using the relative frequency approach, the P(Km=20%) and P(Kw=76-90%) are the highest. The mode for Kw=80%.
4. From the above analysis in (2.), it is established that the variability of observations in the sample population is high. However, some values have significantly high relative occurrences. As a result, and based on the relative frequency approach, the estimates of Km and Kw can be taken as 20% and 80% of manpower respectively. This shows that the involvement of women is very significant and crucial to ASM development.
5. On Gender Gravel production/Cracking rates, the most frequent Pm is 1 tpd and Pw is 0.5 tpd. The cracking capacity of men is about twice that of women. Considering central tendencies, the mode, median and average statistics of Pm are 1.0 tpd, 1.0 tpd, and 1.02 tpd respectively; and that for Pw are 0.5 tpd, 0.5 tpd,

and 0.54 tpd respectively. Considering Variability, that coefficient of variation (COV) statistic of Pm is 20% and for Pw – 40%. These values show low variability of Pm and Pw. On the most likely occurring values, using the relative frequency approach, the P(Pm=1.0 tpd) and P(Pw=0.5 tpd) are the highest. In addition, the central tendency measures for Pm and Pw coincides with the value of highest probability of occurrence.

6. Considering the analysis in (1.) and relative frequency distribution of data, it is established that the predominating and most likely estimates of Pm and Pw are 1.0 tpd and 0.5 tpd respectively.

From the conclusions made in this study it can be recommended that Government should encourage ASM as a means of poverty alleviation by facilitating credits that can be used to improve ASM conditions and practice. Especially, as it is seen that ASM is an avenue for many women to be gainfully employed.

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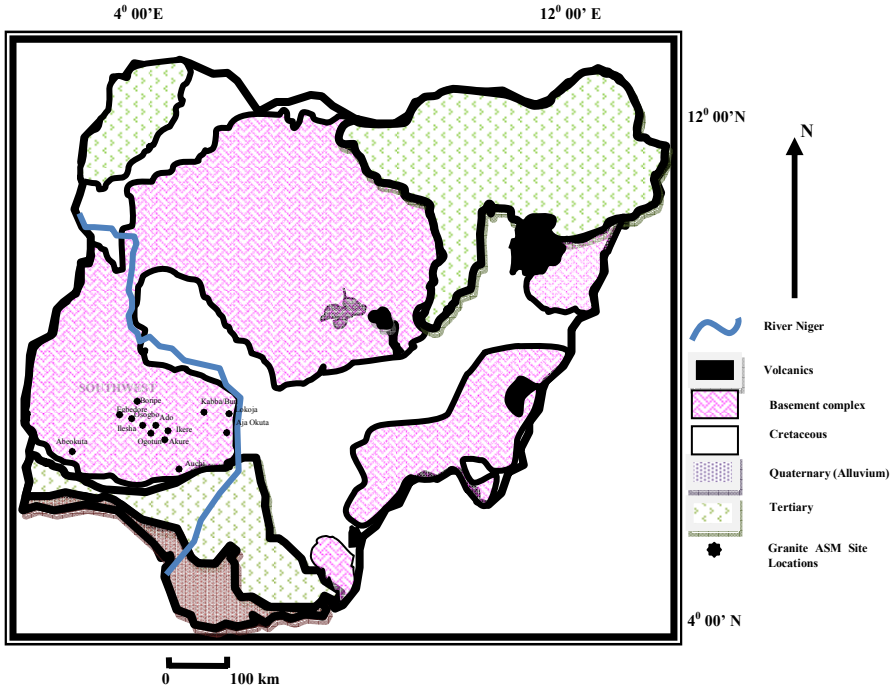

Figure 1: Geological Map of Nigeria Showing Rock Terrains and Selected Granite ASM Sites

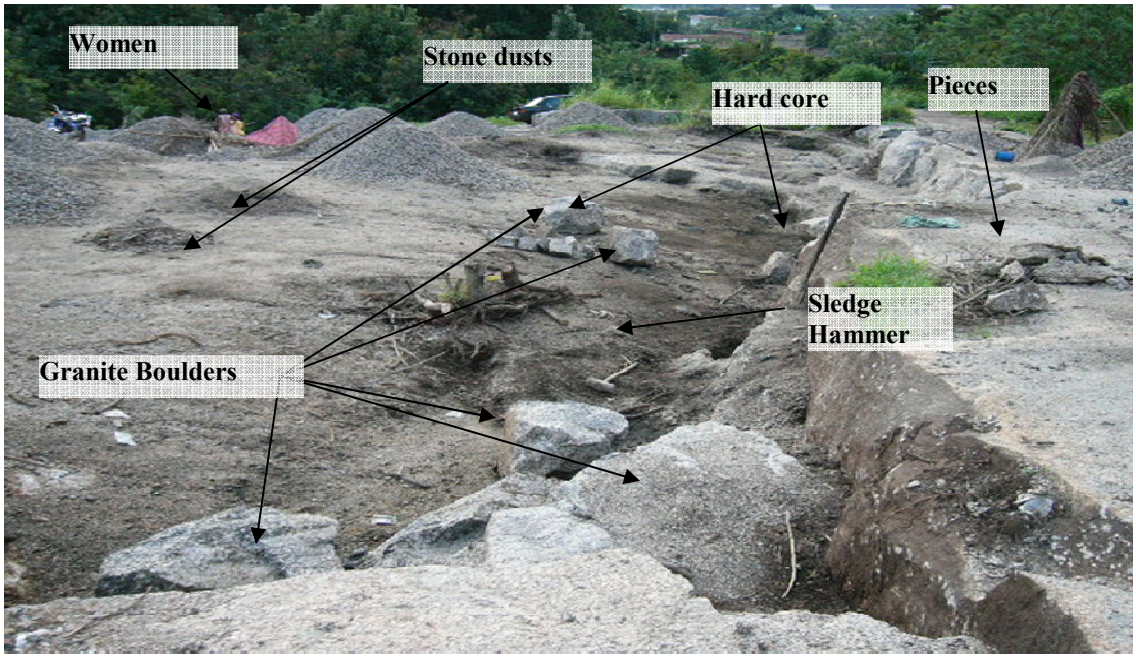

Plate 1: Blasted area of rock in a site

Plate 2: A woman cracking granite rock in a site

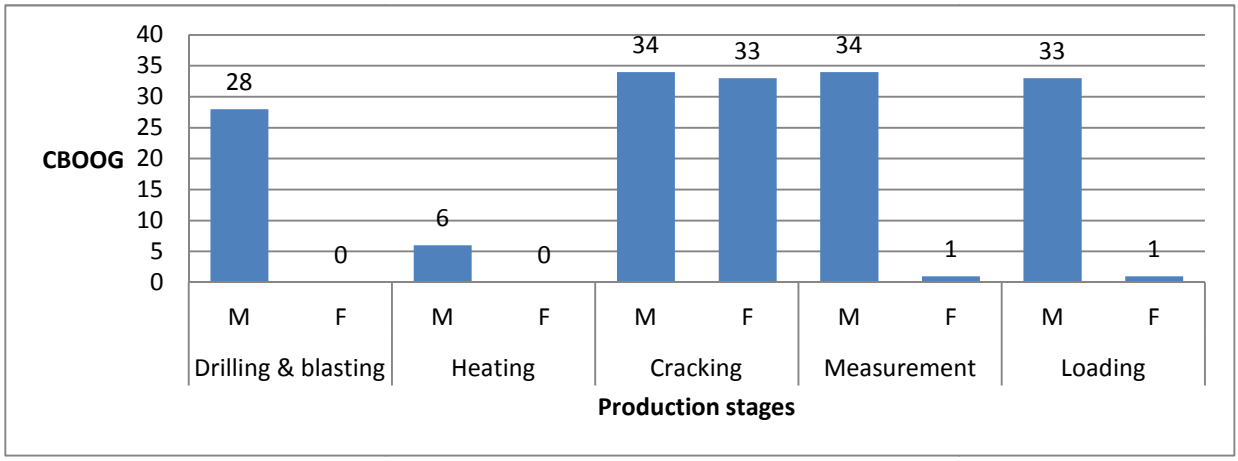

Figure 2: Production Stages and Mining and Counts of Binary Observations of Gender Involvement for Sample population

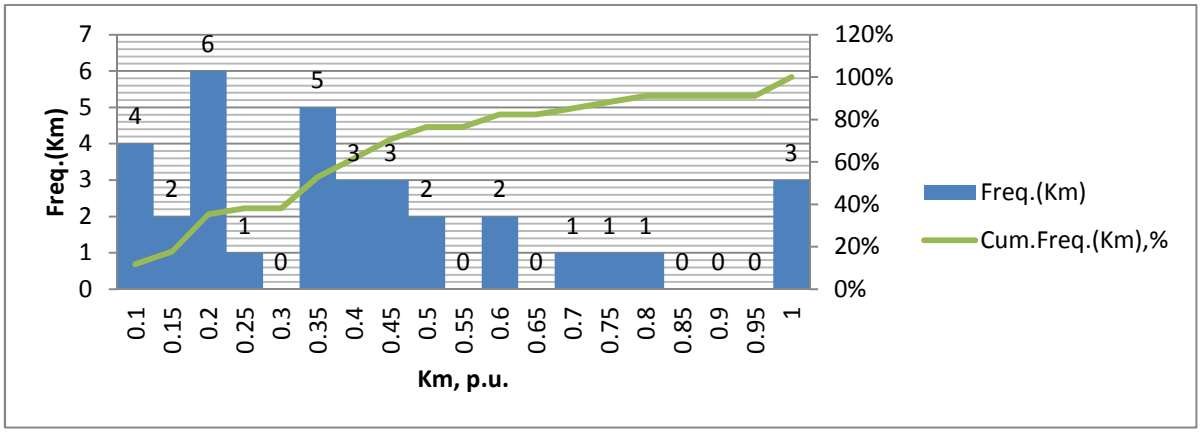

Figure 3: Histogram of observed Km

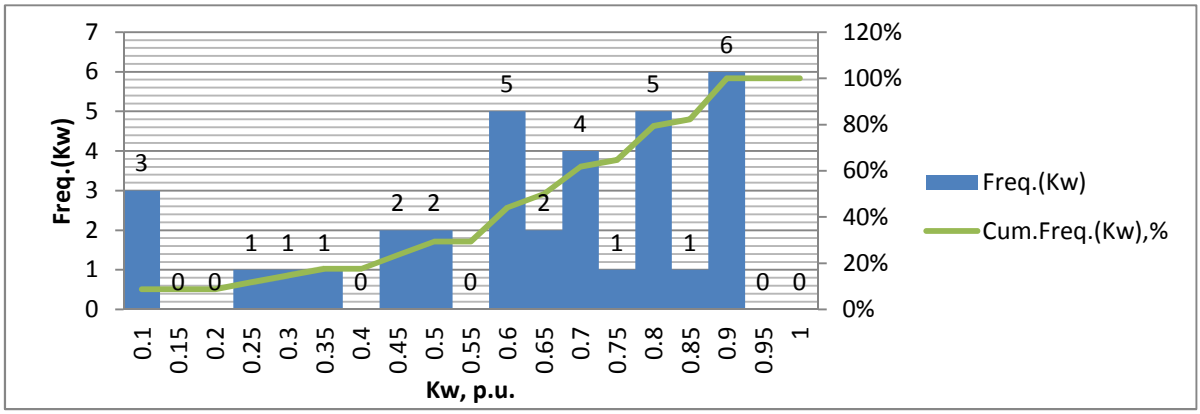

Figure 4: Histogram of observed Kw

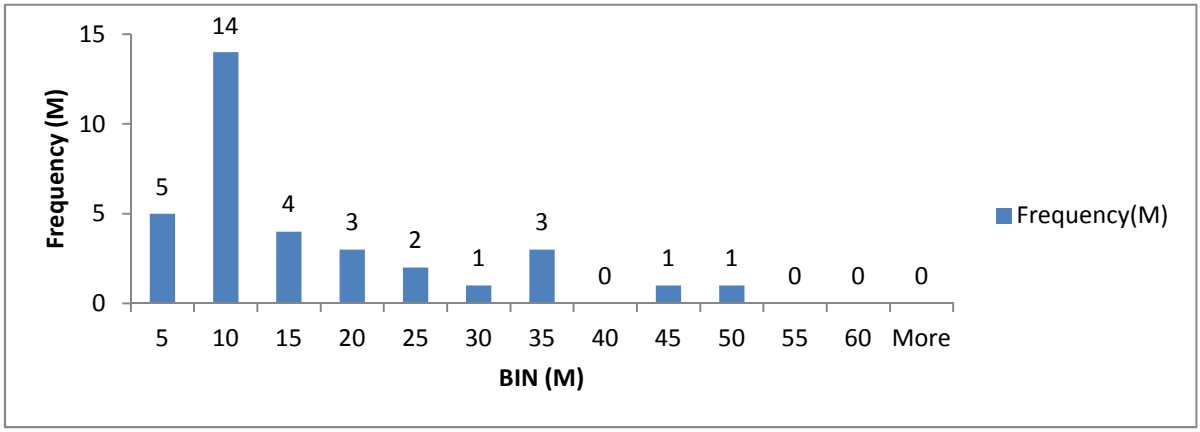

Figure 5: Histogram of observed Manpower

Table 1: Descriptive Statistics of Lm, Lw, M, Km, Kw and Counts of Mgr(m) and Mgr(w)

DESCRIPT. STAT	Mgr(m)	Mgr(w)	Lm	Lw	Lm:Lw	M	Km, p.u.	Kw, p.u.
RANGE			1-47	0-20		3-47	0.1-1	0-0.9
MAX			47	20		47	1	0.9
MIN			1	0		3	0.1	0
MODE			1	3		10	0.2	0.80
MEDIAN			3	6.5		10	0.34	0.66
AVERAGE			8	8	1:1	15	0.4	0.60
COUNT (MODE)			8	5		7	5	5
STDEV			10.85	5.61		11.56	0.26	0.26
COV			1.4	0.7		0.8	0.66	0.44
SKEW						1.32	1.03	-1.03
COUNT	29≡ 85%	5≡ 15%				34	34	34

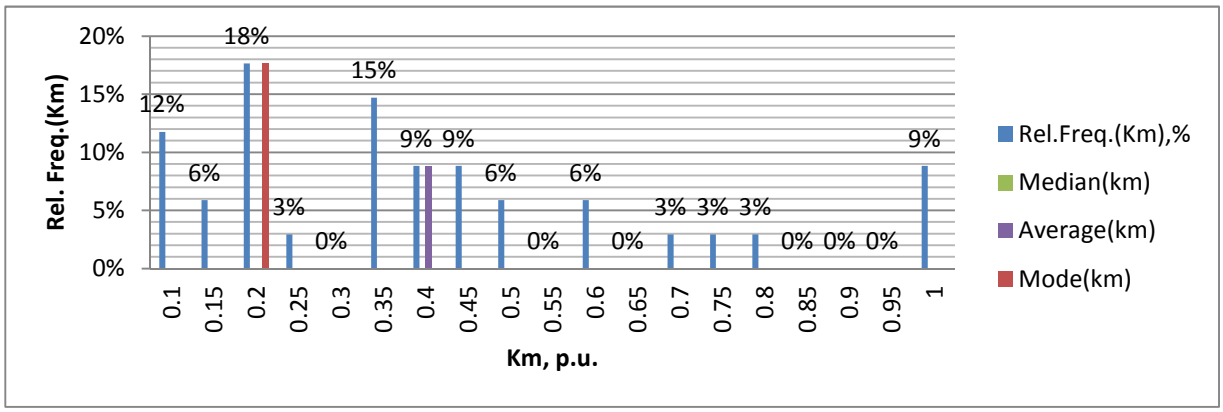

Figure 6: Relative frequencies of Km data

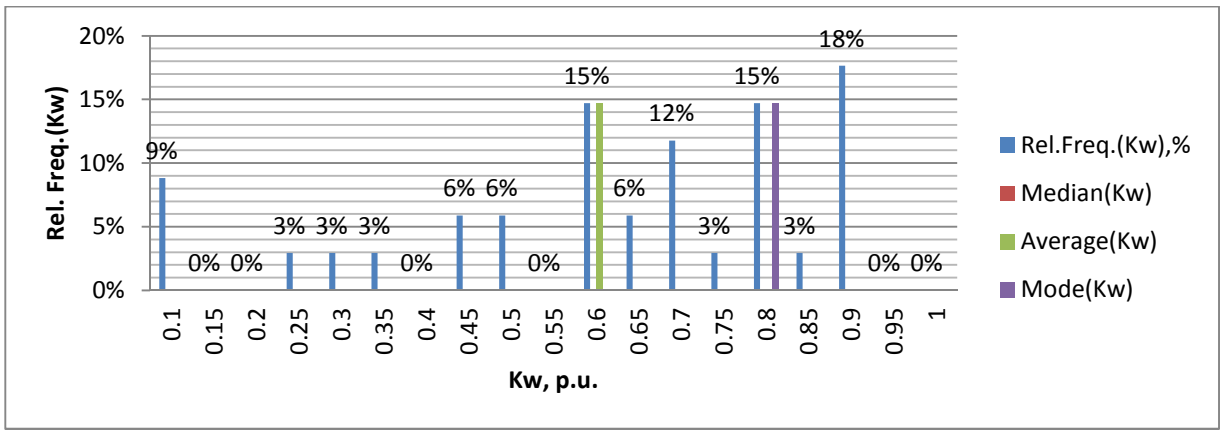

Figure 7: Relative frequencies of Kw data

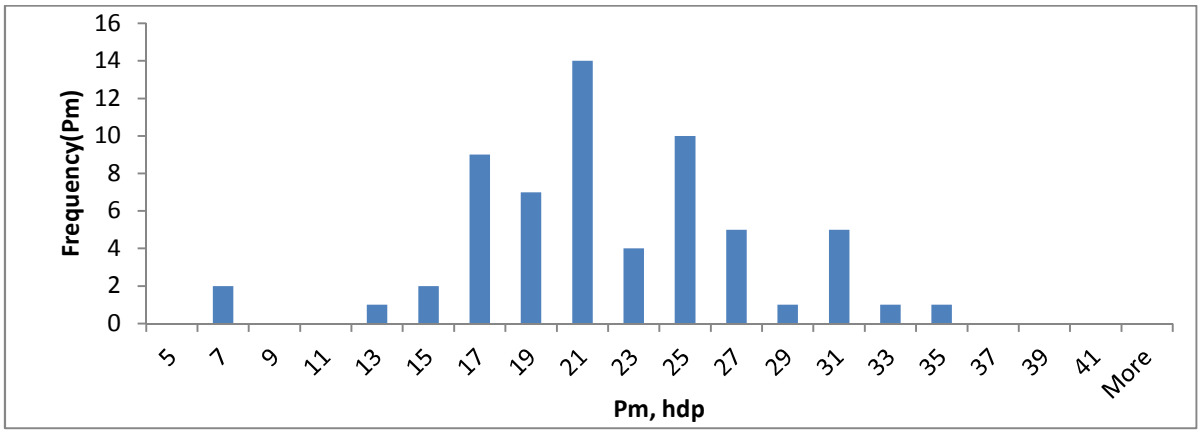

Figure 8: Histogram of Pm, hdp, in sample population

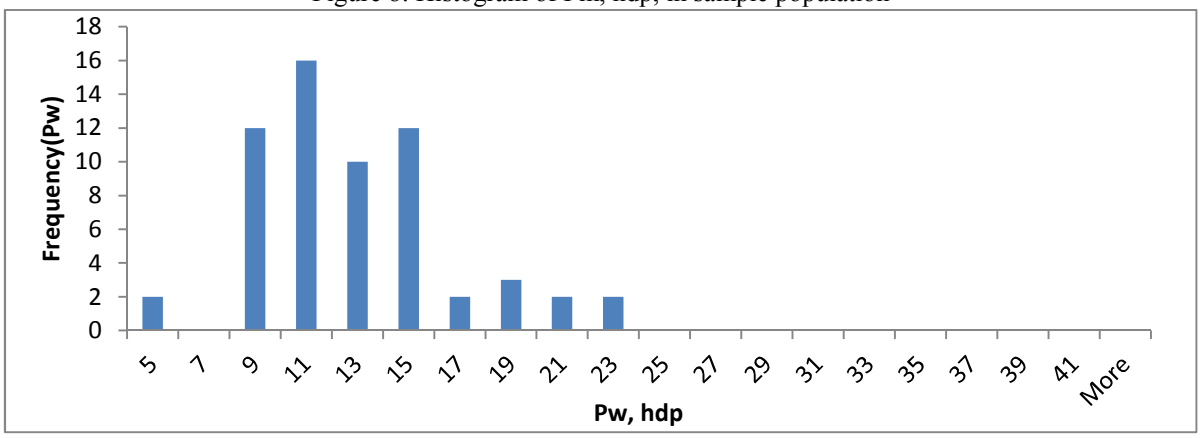

Figure 9: Histogram of Pw, hdp, in sample population

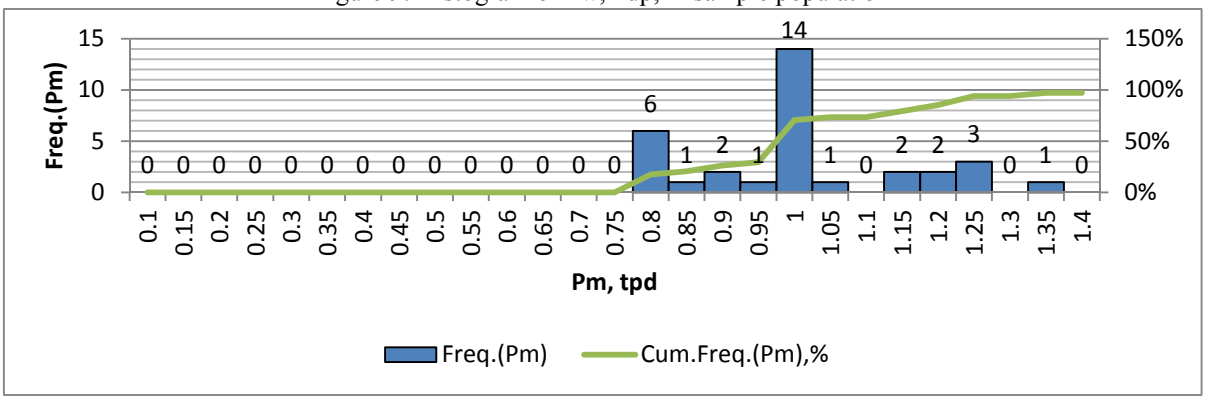

Figure 10: Frequency and Cumulative Frequency Distribution of Pm Data in tpd.

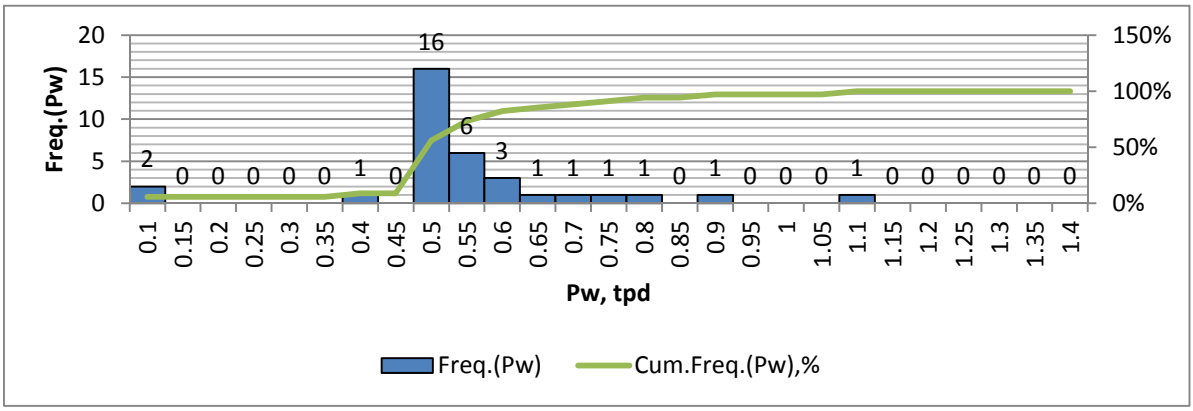

Figure 11: Frequency and Cumulative Frequency Distribution of Pw Data in tpd.