CAPACITY BUILDING FOR BLOCK MOULDING INDUSTRY: SOME DESIRABLE INPUTS FOR SUSTAINABLE DEVELOPMENT

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Abstract

Sandcrete block moulding ordinarily should be a thriving building construction material production business in most cities and urban cities in Nigeria, striving to meeting its demand as a cladding material in housing delivery schemes. Literature findings however reveals that block moulding firms produced below below optimal levels, innovations and strategic market positioning are low resultant of financial inadequacies.,. . Using firms in Jos metropolis, a city situate in North central region of Nigeria as case study, the paper examines and reports the activities of sandcrete block moulding firms. Research findings using a statistical tool of regression establish as follows: (i) production and sales have a strong positive relationship, indicating an R-Square value of 99.36%. (ii) a weak negative relationship exist between production and breakages, recording an R-square value of 46.12%. (iii) production and breakages were found to be influenced by seasonal variations, as shown by a T-test recording differentials in the mean values of production during the rainy and dry seasons. Also there were differences in the values of the mean sales during the two seasons. It concludes that running a sustainable block moulding industry detects the adoption of the variables of capacity building and skills acquisitions; innovations and entrepreneurship competencies and strategic market positioning as desirable inputs, for the emergence of mega and world class block moulding industries. It advocates public-private initiatives, engineered by micro-finance as complementary procurement strategies for these firms.

Key Words: (i) Sandcrete Block Moulding (ii) Entrepreneurship (iii) Capacity Building and Skills Acquisitions.

Introduction

The above scenario depicts a block moulding industry that appears to have low optimal productive levels, high levels of machine inefficiency engineered by relatively inexperienced, not so educated personnel who have low capacity.

Needs (2003a), identifies a Nigerian private sector that is dogged by weakness in its inherent skewed structure; multi-nationals who depend heavily on imports as enclaves with little or no linkage to the multi-nationals and a private domestic sector that is stagnant. This occurrence creates a private sector that does not induce competitive environment, large due to poor state of physical infrastructure, the high cost and limited access to appropriate financing. High cost of imported raw materials, equipment and spare parts and lack of skilled labour are some other challenges.

Aim

The research intends to examine the dynamics of the production of hollow sandcrete blocks in Jos metropolis (a city situate in the North central region of Nigeria) with a view to identifying all trends and contributory variables, advance and review appropriate measures, inputs and strategies that are likely to improve the efficacy of their operations and thus alleviate poverty; enhancing the livelihood of the merchants, other stakeholders employees of the industry in a sustainable manner.

Objectives

The following are the objectives of the research:

(i)   Advance innovative measures and tactics that will enhance production, sales and income levels.

(ii)   Attempt to create atleast a state of equilibrium between demand and supply.

(iii)   Attempt to delimit the activities of these firms beyond the confines of local and national boundaries; make them global actors among other national equals.

(iv)   Advance measures that would increase skills and build up ultimately leading to increased revenue, alleviate poverty, enhanced eco-system and sustainable development.

(v)   Use the outcome of findings as future guidelines for operations.

Scope

Some sandcrete block moulding firms in Jos metropolis were randomly chosen as samples for the study based on a period.   The mode of production – is machine; the Rosacmeter. The materials considered for production; are cement and sand, without any form of additives.   The research emphases and focuses on the dynamics of management of resources of block moulding industry.

Assumptions

In order that the empirical validity of the research findings are upheld within the bounds of its scope, the following are made:

(i)   The cost of production – (material ratios, machines and equipment efficiency and labour inputs are the same for all the firms studied).

(ii)   The same level of management, production and entrepreneurship capacities are obtainable and remain in existence for all firms studied.

(iii)   The same quality and mix of cement and sand is maintained for all firms.

(iv)   The economic situation in the country is relatively stable during the study period.

Justification of Study

The UN millennium development goals are action plans that are targeted towards the eradication of extreme poverty and hunger, this it hopes to achieve through capacity building that will bring about sustainable developments through investments.

The UN millennium project (2005) and (Needs 2004b) recognize the important roles private businesses could play towards the realization of the goals. Sustained economic growth in developing countries is a function of a vibrant private sector. A sector that drives informal employment to formal employment in an internationally competitive manufacturing and services; creating productive jobs, enhanced productivity and improved quality of life is most desirous. The achievement of the above is a function of the private sector's ability to meet social responsibility through investment, taking opportunities for rapid and sustainable growth that create international competition through quality products and services, using skills and professionalism of local human resources.

Fullerton (1979), (Seeley 1995), identified wall as a very important component of building construction. Walls may be required to divide space into areas of convenient size, keep out dust and rain and yet let in air, provide shade, coolness, privacy, shelter and protection. Provide aesthetically pleasant sight and in certain cases provide support for the upper floors or roof (i.e. to be structurally load bearing) and provide spaces for windows and doors. The predominant usage of sandcrete blocks as walling material in the study location, grants impetus to study.

Literature Review

Sandcrete blocks are undoubtably one of the predominantly used materials for building construction in Nigeria. Its percentage composition in cost profile analysis is between (6-8%) for building not exceeding 5 storeys. Seeley (1993) and Mac-Barango (2003).

The production process involves machine moulding, vibrated or through hand moulds. The common machine used is the rosacometer machine. The common used materials are

cement and said mixed to some acceptable standards. The quality of the sandcrete block produced is influenced by the batching of the mix and the right quantity of water to enhance hydration of the cement. The curing and drying process after the mould has formed also affect quality of blocks. The storage and the stacking process are other potent variables that influence quality.

The management variables of capital, land, labour and entrepreneurial functions, have high propensities to influence the production outputs of the firms. The effective utilization and blending of these factors of production within the right mix is likely to engineer desired optimal production levels.

In a related manner Bassey (1994) commenting on the variables that influence the efficiency and effectiveness of plants and machines identifies obsolesce and depreciation levels as factors that need serious and critical appraisals during production operations. Absence of a critical appraisal could lead to low production output, idle time of machines, to long drying time, in the case of block moulding industries. Mechanical plants make work more efficient and the mechanical plant manager must have efficiency in mind while selecting the plant to be used for construction.

Holmes (1995), contends that plant is an important construction resource. Deriving the full benefits of its efficiency and effectiveness detect that cognizance be given to issues of outputs, continuity of work, training of operatives, maintenance and repair of plant as a major factor must appraise the age and condition of plant, cost of spares, labour and overhead cost and desired care of plant by the operator.

The resultant outcome of short falls in any of the observed variables is likely to induce a disequilibrium in demand and supply of sandcrete blocks. Seasonal variations further exacerbate the situations, leading to low income and poverty. In an emerging global trend, building materials merchants are expected to deliberately attempt to take activities and products beyond their national boundaries, adopt proactive measures inorder to survive and grow.

The paper identifies strategic positioning, competitive, intelligence, capacity building of personnel skills and the activities of these firms as modus operandi for the achievement of globally sustainable firms.

Entrepreneurship

Businesses are becoming more global and national boundaries less relevant. Firms need to create and sustain a strategic market positioning using the tool of competitive intelligence.

In a similar vein (Hasagawa & Shimizu, 1988) opined that the successful performance of world class companies in the global arena detects that they create a strategic position, allocating adequate resources to the effort and ensuring that everyone in the firm, particularly top management is committed to the position created.

Porter (1991) contends that strategic positioning, carves out a niche and establishes an obvious differential in the activities of firms who are strategically positioned and others. This vantage position leads to profitability, necessitated by trade-offs of opportunities in machinery, equipment, skills and operational activities.

In a related manner, Porter (1996) observed that firms to be strategically positioned, they need the usage of the tool of competitive intelligence, which ensures that strategic position is done within the limits and confinement of some operational scope, activities which detect what, when and how firms activities are configured. This eliminates logical in consistencies in pursing several types of advantages or different scopes simultaneously. Positioning trade-offs are essential because they avoid inconsistencies in among others, machinery, equipment, skills and management systems. Highly developed competence in a particular sub-sector enable firms to pursue opportunities and create some others wherever conditions allow and create strategic positioning in a global context.

Soubra (1989) and OECE (1992) observed and advanced the conditionality of acquaintance, with the potential local client, within the context of strategic positioning stating that despite their global pedigree they should concurrently provide optional and customized services to the client. These would be outside core service areas.

Teece *et-al.* (1997) and Ngowi (1997) suggest that once a strategic positions is created a firm needs to continuously innovate valuable new service features before competitors, take advantage of them, producing imitation by incumbents who are likely to copy it by repositioning themselves.

Ngowi *et al* (2000) contends in a summative manner that to create and sustain a strategic position a firm needs global information about the intended or created position, the local clients needs which lead to a demand driven decisions and operations, continuously innovate in materials, equipment and the general direction of firms. Others include a

competitive intelligence scheme that is research orientated providing answers to inherent challenges, risks, opportunities and market threats, the potentials and weakness and the external treats from competitors.

Fuld (1985) views intelligence gathering as sorting out numerous bits of data and assembling them into a cogent and usable form of information or intelligence. It is a process of data collection that relates to target evaluation, analysis and the utilization of outcome for decision making.

According to Gilad and Gilad (1988) business competitive intelligence is all about data ranking, collection and its usefulness and currency. Storage, organization and analysis of data and dissemination, the use of the resulting intelligence for decision making. The majority of the information are got from field and published sources with continual appraisal by the Research and development (R & D) units of firms, bordering on issues like what other say about the competitors and what others say about the competitors relying on information from books, business periodicals, company and industrial research and technical journal. These processes are done with a critical appraisal of firms projections. Forward movement proposals and position taking into cognizance firms inherent challenges and risk with the sole objective of preventing surprises that could jeopardize a business, also assessing opportunities and market threats.

In the arena of business, competitive intelligence gathering is nobody's exclusive right and monopoly. It is imperative to take note and be aware of the potency of other competitors capacity on intelligence gathering and targets at the firm. Other competitors may deliberately plant misinformation targeted to keep the firm pre-occupied and off-balance (Mc Gonagle & Vella, 1990).

Capacity Building

Capacity building and skills acquisition serve as a corollary and an aftermath of efficient and effective competitive intelligence report that induces a strategic market position. Competitive intelligence detect the level, extent and direction of capacity building and skills acquisition; this enhances innovative strategies and tactics; which accords firms and personnel the leverage to venture into new in roads to production operations and methodologies. New effective and efficient machines' and equipment utilizations and materials are the manifestations of capacity building and skills acquisitions. Capacity building brings with it rightful skills, enhance financial analysis, material procurement, sales and production analysis and marketing

strategies. It propels improvement and enhances organizational and/or individual ability towards its mission; adopting and providing coaching and training, management development funds, assisting individuals and organization towards the general upgrading in performance, with a likely propensity to attainment of world class skills.

The attainment of world class skills that are relevant and useful at specific period makes capacity building a continual process, updated to reflect and meet organizational needs. Murphy (1983) contended that the attainment of world class capacity and skills detect that the operations must be within the global arena and context, if a strategic market is to be attained, revealing further that such world class skills invoke innovations.

Methodology of Study

The work is majorly effected by field work that examines the dynamics of the production of hollow sandcrete blocks in Jos.

(i)   The parameters of interest are production, sales and breakages for a two year period, (January to December each year).

(ii)   A sample population of 10 (Ten) block moulding industries were randomly selected, five each from the North and South ends of the city. Firms chosen form the Northern end include Farin Gada, Gada Biyu, Ring Road, Liberty Boulevard and Bauchi Road. The southern end include firms within the areas of Wholshe, Dogo Karge, Favwel and Rayfield. The mean values of the totals of each of the parameters (production, sales and breakages) figures for the ten firms are collated; this forms the basis of analysis.

(iii)   Tools (Analysis Technique): the statistical tool of regressional analysis (both simple and multiple determine the relationship existing between variables). Analysis of variance tests the differences and the factors that account for those differences along seasonal lines (Dry and Rainy Seasons).

(iv)   The co-efficient of determination (R^2), determines the extent of relationship existing between two or more of the parameters of interest. The Fcal, Ftab and P-values establish significance levels of the relationship, put at 50%. It also determines the decision to accept the Null hypothesis.

(v)   Statistical computer package (SPSS), analysis the data. Logarithmic and other exponential transpositions of the parameters are also evaluated.

(vi)   Descriptive analysis: Graphs and charts illustrate and establish trends and pattern between the parameters, during the study period.

Table 1:   Regression analysis between average production and average sales of hollow sandcrete block (225mm) in jos metropolis

Analysis No.	Variables		Mode of Experiment	Results of Experiment	Inferences					Strength of Relationship	Remark
	x	Y			Regression Equation	R^2 (%)	F_{tab}	F_{cal}	P_{value}		
Analysis. 1a	ASales9	AProd9	Linear		AProd9 = 1499.56 + 0.97Asale9	99.36	4.96	1551.85	0.00	Very Strong	S.S
Analysis. 1b	ASales9	AProd9	Log.		AProd9 = -180782 + 20385.69Asale9	99.37	4.96	1585.53	0.00	Very Strong	S.S
Analysis. 1c	ASales9	AProd9	Quad.		AProd9 = -3460.82 + 1.45Asale9 – 1.12E-05^2Asale	99.43	4.26	777.88	0.00	Very Strong	S.S
Analysis. 1d	ASales9	AProd9	Cubic		AProd9 = -3460.82 + 1.45Asale9 – 1.12^2Asale9 + 2.83^3Asale9	99.43	4.26	777.88	0.00	Very Strong	S.S
Analysis. 1e	ASales9	AProd9	Exp.		AProd9 = 8516.76 + 4.4E05Asale9	98.85	4.96	861.21	0.00	Very Strong	S.S

Key: SS = Statistically Significant

NS = Not Significant

Observation and Inferences

The regression equation of the analysis (AProd9 = 1499.56 + 0.97A sales 9) shows a positive linear relationship between the variables tested with a positive base value of 0.98. This indicates that both variables moves in the same direction i.e. as the independent variable increases the dependent variable also increases. The analysis has an R-sq value of 99.36%,

this indicates that this percentage accounts for variables that impact on sale of 225mm block are due to production factors. The Ftab value of 4.96 is less than the Fcal value of 1551.85 and a P value of 0.00 which is lower than 0.05 level of significance used in this study. The research therefore, establishes a very strong relationship.

Table 2:   Regression Analysis between Average Production and Average Breakage in Hollow Sand Crete Block (225mm) in Jos Metropolis

Analysis No.	Variables		Type of Model	Results of Experiment					Inferences	
	x	y		Regression Equation	R^2 (%)	F_{tab}	F_{cal}	P_{value}	Strength of Relationship	Remarks
Analysis 2a	AProd9	ABreak9	Linear	ABreak9 = 171.96 – 0.00Aprod9	46.12	4.96	8.56	0.02	Weak	S.S
Analysis 2b	AProd9	ABreak9	Log.	ABreak9 = 865.26 – 76.90Aprod9	49.59	4.96	9.84	0.01	Weak	S.S
Analysis 2c	AProd9	ABreak9	Quad.	ABreak9= 778.13 – 0.06prodA9 - $1.27E-06^2$Aprod9	75.79	4.26	14.08	0.00	Very Strong	S.S
Analysis 2d	AProd9	ABreak9	Cubic	ABreak9= 778.13 – 0.06prodA9 - $1.27E-06^2$prodA9 – 1.03^3Aprod9	75.79	4.26	14.08	0.00	Very Strong	S.S
Analysis 2e	AProd9	ABreak9	Exp.	ABreak9= 202.02 – 3.39E-05Aprod9	45.68	4.96	8.41	0.02	Weak	S.S

Key: SS = Statistically Significant

NS = Not Significant

Analysis 2: The regression equation A break 9 = 171.96 – 0.00 A prod 9, shows a negative linear relationship between the variables tested with a negative value base of 0.00. The equation indicates that the variables move in different directions i.e as the independent variables increases the dependent variable decreases. The R-Sq value of 46.12% indicates

that, only (46.12)% of the total variation in production of 225mm block can be explained by variations in breakages. The equation and significances a strong relationship. The Fcal value of 8.56, which is greater than Ftab of 4.96 suggest that there is statistical linear relationship production and breakage, the P value of 0.02, which is lower than 0.05, also necessitated rejecting the null hypothesis.

Table: 3: t-Test for Seasonal Production of 225mm Hollow Sand Crete Blocks in Jos

	Zone	Season		T_{tab}	$T_{cal.}$	P_{value}	Remark
		Raining	Dry				
Analysis							
3	Aprod9	20137.75	25515.50	1.812	-4.95	0.00	S.S

Key: SS = Statistically Significant
NS = Not Significant

Observation and Inference

From experiment 3 above, the t-test shows that the mean production in dry season is higher than the mean production in rainy season. The T-calculated value of -4.95 is lower than the T-calculated value of 1.812 which indicates that the difference is statistically significant. Also the P value of 0.00 which is below the boundary of 5% (0.05) confirms the remark. Thus the null hypothesis is rejected.

Table 4: t-test for seasonal sales of 225mm hollow sand crete blocks in Jos

Zone	*Season*		T_{tab}	$T_{cal.}$	P_{value}	Remark
	Raining	Dry				
4 ASales9	19280.88	24758.29	1.812	-4.78	0.00	S.S

Key: SS = Statistically Significant
NS = Not Significant

Observation and Inference

From experiment 4 above, the t-test shows that the mean sales in dry season are higher than the mean sales in rainy season. The T-calculated value of - 4.78 is lower than the T-calculated value of 1.812 which indicates that the difference is statistically significant. Also the P value of 0.00 which is below the boundary of 5% (0.05) confirms the result.

Description of Charts

The descriptive charts shows the pattern and trends of the average production and sales levels of hollow sandcrete blocks. It is observed that the period April to September has the lowest production and sales level, with the contrasting higher levels during the period (October to December) and January to March. The trend of average production and breakages levels, indicate that the highest number of breakages were recorded between the months of June to September while the months of January to March recorded the lowest level of breakages.
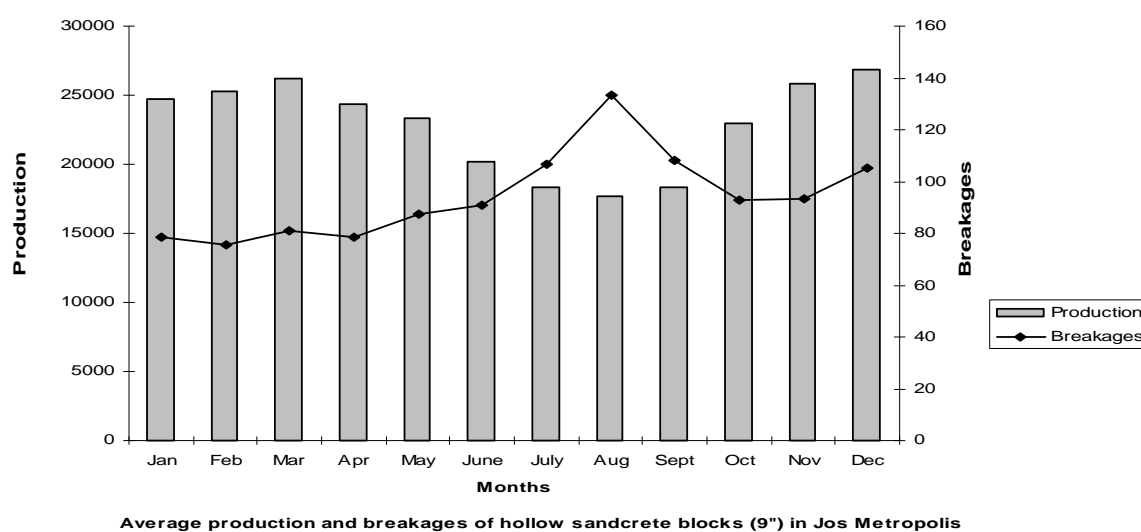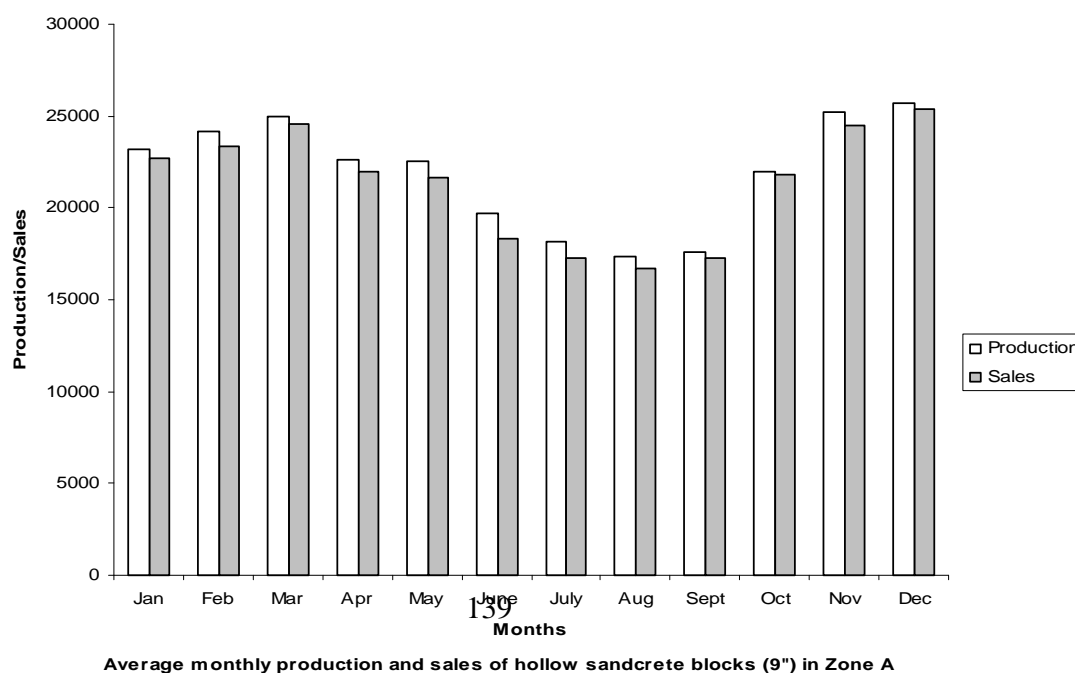
Fig. 1.

Average production and breakages of hollow sandcrete blocks (9") in Jos Metropolis

Fig. 2.

Average monthly production and sales of hollow sandcrete blocks (9") in Zone A

Discussion of Results & Implications

The research findings establish that (1) strong positive relationship between production and sales (2) a weak negative relationship between production and breakages (3) Also both production and breakages were found to be influenced by seasonal variations.

Implication of Results Outcome:

Analysis No. 1:

Production and sales: This is indicative that for every unit of sales made a corresponding increase is demand of production level. This tends to explain the issue of low production output. The implication of this outcome therefore tends to manifest the need for capacity building and skills, that should be able to march and operate desired production inputs, sequel to innovations in (machines and equipment) and materials. It is most desirable that demand levels are met, for sustainable development of the firms by way of enhanced profit margins.

Analysis No. 2:

Production and breakages: The outcome of this analysis establishes that as production level increases, the breakage reduces. The occurrence of breakages with respect to this analysis do indicate or suggest that should improvement be recorded in production techniques and skills, breakages occurring from production will tend to be infinistimial. This further amplifies the need for capacity and skills acquisition as it concerns the dynamics of sandcrete block production. This would lead to increase in profit level.

Analysis No. 3:

Production and seasonal variations. The outcome of result establishing the difference between production in the dry season and wet season, indicates that the mean production in dry season is higher than the mean production in wet season. The t calculated value was lower than the t-tabulated, which shows that the difference is statistically significant. Also the P-value was below (0.05). It is likely that improvement in capacity and skills, innovative production techniques and entrepreneurship skills is likely to bridge differential in production levels during the dry and wet seasons. The impact of weather is likely to be reduced, when these variables are enhanced.

Analysis No. 4: Sales and Seasonal Variations:

The outcome of result establishing the difference between sales levels in the dry and wet season, indicates that the mean sale in dry season is greater than the mean sale in rainy season. The t-calculated value was lower than lower than t-tabulated, which indicates that the difference is statistically significant. Also the P-value was below (0.05). It is likely that improvement in capacity and skills, innovative production techniques and entrepreneurship skills is likely to bridge differentials in the sales levels necessitated by seasonal variations.

Conclusion

Sandcrete blocks, is the predominant material used in cladding in walls construction in Jos Metropolis. The dynamics of its production establishes that the production techniques with respect to materials, machines entrepreneurship and personnel skills appear to have stagnant innovative strategies and inputs appear infinistimal. Research findings established that (i) production is highly influenced by the level of sales; increases in sales induce a corresponding increase in production level. (ii) breakages during production showed a weak relationship, also establishing that breakages during the rainy season were higher, while dry season recorded higher production levels. (iii) Higher levels of sales occur during the dry season, with the wet season recording lower sales levels.

Recommendations

Block moulding industry to survival and grow in a boundaries less dimension detect that they create and sustain a stratetic market position, necessarily adopting the tools of competitive intelligence, capacity building and skills acquisition (world class skills at that, be acquired). This leads to innovate strategies and measures that begets enhanced production methodologies and subsequently high productivity. It is necessary that the tools of management are integrated in the production process, this leads to high profitability and a concomitant enhanced income, that logically leads to poverty alleviation of the firms, personnel, and the immediate environment were the firms are situated.

Specifically, the observed shortfalls in production, recorded high levels of breakages and low sales during the wet seasons are likely to be reduced to barest minimum, resultant of firms that adopt and integrate the variables herein before highlighted in the earlier segment of the paragraph.

Implementation Strategies

The Study advocates the following:

(i). Expansion of business and production activities, to be achieved through the adoption of some form of pu8blic-private initiates, engineered by micro-finance to boost capital base of firms obtaining some micro-finance to boost the capital base of firms.

(ii). The adoption of indoor production during the wet season, building sheds for mixing and moulding and then curing and drying done in an auto clave or klin.

(iii). Firms should employ highly skilled personnel, optimally using them through the purchase of modern equipment and machines.

(iv). Firms to adopt improved marketing strategies; visiting construction sites and convincing prospective customers.

(v). Quality assurance of blocks, to be maintained through laboratory testing of samples.

(vi). Some form of discounts could be offered prospective customers based on quantity of block purchased.

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