PRODUCTION OF BUILDING MATERIAL INPUTS IN GHANA: A CASE STUDY OF SANDCRETE BLOCK MANUFACTURERS IN KUMASI

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ABSTRACT

In Ghana and almost all countries on the globe, sandcrete blocks constitute a major building material input in the construction industry. This is particularly the case in the urban areas. In Ghana sandcrete block manufacture for commercial purposes is primarily in the hands of the private sector. The industry is fraught with many problems, but against that background, there are prospects and opportunities. This paper examines the sandcrete block manufacturing industry in Kumasi outlining its problems and prospects. The problems range from difficulties in raw material acquisition, limited finance, through poor conditions of service for the workers to debilitating environmental degradation. The prospects include a favourable policy environment, international credit support, availability of appropriate educational and research institutions, availability of raw materials locally and rapid population increase and urbanisation which provide a market for the commodity. Sancrete block manufacture generates employment and income for the urban poor. In terms of action, the industry will require a union or association to draw official recognition to it for appropriate location, shared and adequate infrastructure, knowledge and experienced workers. Welfare services are to be given the needed attention. The environmental agencies are to ensure environmental improvement in areas already worked on and sound environmental practices on virgin resource grounds.

Keywords: **Building materials, Sandcrete Blocks, Kumasi, Manufacturing**

INTRODUCTION

Independent from the British colonial rule in 1957, the sovereign state of Ghana (figure 1) became a republic in 1960. It covers a total land mass of 238,533 square kilometres now inhabited by about 20 million people. With a crude birth rate of 44 persons per 1000 and a crude death rate of 13 persons per thousand, the population growth rate in the country is dramatic. Urbanisation has also been considerable since the 1960s. In 1960, 23 percent of the nation's population of 6,726,815 lived in settlements with the populations 5,000 people and over which officially are referred to as urban centres. In 1970, the national population stood at 8,559,313 and the urban population constituted 29 percent. In 1984, 32 percent of the country's population of 12,205,574 was urban. [1]. Currently the estimated proportion of the urban population of the nation is 36 percent.

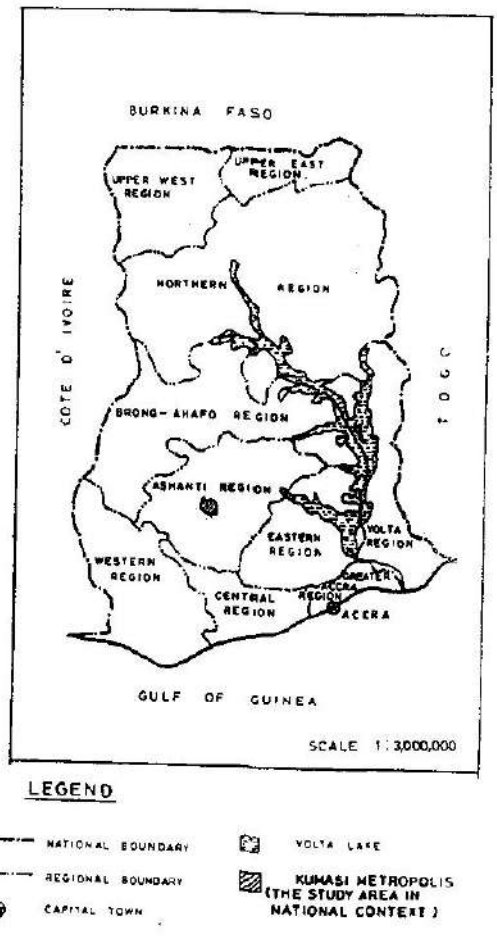

Fig. 1: The Study Area In The National Context

METHODOLOGY EMPLOYED

To attain the objectives of the study a stratified quota sample of sandcrete block manufacturers was selected for investigation. The city of Kumasi is subdivided into four Sub-Metropolitan Areas namely Manhyia, Subin, Bantama and Asokwa (figure 1). From a preliminary visual observation of the sandcrete block making activities in Kumasi, it was realised that they were concentrated mostly along the eight major arteries radiating from its Central Business District (figure 2). The absence of any records of block makers'

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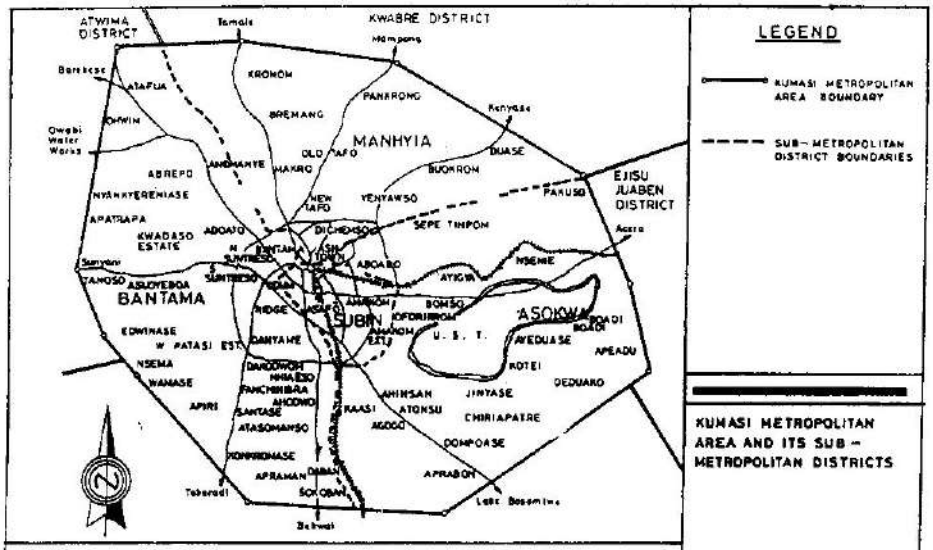

Fig. 2: The Study Area (Kumasi Metropolitan Area)

precluded the determination of a statistically accurate or representative sample. Twenty sandcrete block producers were purposely chosen from each Sub-Metropolitan Area in order to capture a broad spectrum of the nature of the operators and their activities in the city. In each sector the twenty-block producers were picked by moving along the selected roads and interviewing any operator that was prepared to be interviewed until the total number of 20 operators was achieved.

DISCUSSION

The Need for Sandcrete Blocks

The activities of the sandcrete block manufacturing industry have been on the ascendancy in recent years. This is in response to the increasing demand for housing and other constructional activities such as markets, schools, hospitals, workshops and office accommodation. In January 1991, the government of Ghana launched an "Urban 11" project in five selected urban places in the country. These included Accra, Tema, Kumasi, Sekondi-Takoradi and Tamale. The "Urban 1" project earlier completed, was meant to develop Accra as an appropriate national capital. The objective of "Urban 1" was to upgrade and manage the urban centres concerned to enable them accommodate the pressures of rapid urban growth in the country.

With the view that only a comprehensive multi-sectoral and integrated approach urban redevelopment and management will create the necessary catalyst for sustained growth, the Kumasi Metropolitan Assembly (KMA) prepared a comprehensive Urban 11 project for the city. Three areas of concern in the building material production industry included the decongestion of the Central Business District through the building of market complexes at Tafo and Kwadaso, Suame Light Industrial Area upgrading and Esereso Site and Service Scheme development.

The vital role of the block making industry to the structural development of the city and in providing employment and income to the people called for a thorough study of the nature of its operation and performance.

Type of Sandcrete Blocks

Throughout Ghana sandcrete blocks made from a mixture of cement and sand were the most common walling material in the urban areas. The blocks are produced without specification although the British standard 2028 precast concrete blocks were quoted in the building regulations for better quality work. The types of blocks produced were the hollow and solid blocks. For both type of blocks two sizes are common, the six by twelve inches (6" x 12") and the five by twelve inches (5" x 12"). The factors which tend to influence the location of the sandcrete block manufacturing enterprises were proximity to customers and the availability to undeveloped sites. The sandcrete block manufacturers are mostly located on undeveloped plots or open spaces in residential areas, light industrial and on road reservations. Fifty-seven percent (57 percent) of the block producers interviewed were located on undeveloped residential plots. Developers had not been able to put their plots into their designated uses and as a result reallocated them to the block manufacturers for temporary use. Those who located on reserved public open spaces constituted 20 percent. The rest (23 percent) were holders of leaseholds who had not as yet developed their premises.

Raw Material Inputs

The raw material inputs for the manufacture of sandcrete blocks were cement, sand and water. The sources of cement were Takoradi, Tema, and Kumasi. Whilst Takoradi and Tema with their factories favoured bulk purchases, Kumasi as wholesale and retailing centre served both bulk and small unit orders. Most (80 percent) of the block manufacturers obtained their cement from Kumasi. Of the rest eight percent and twelve percent ordered their cement from Takoradi and Tema respectively. The average price of a bag of cement was 8,600 cedis as at the time of this study.

The block manufacturers obtained the bulk of the sand aggregates from the immediate environs of Kumasi which were mainly potential farming areas. The main sand resources areas were Abuakwa, Ahodwo, Tanoso, Kenyase, Nsenia, Awumaso, and Sepease. The price of a truck load of sand as at the time of this investigation was 700,000 cedis.

Finance

For 80 percent of the respondents, initial capital for their investment came from their own personal savings. Whilst seven percent received help from their relatives living abroad, 13 percent had theirs from relatives and friends in Ghana. Access to institutional finance was not identified with the block manufacturers.

Technology

Two kinds of block making machines were identified during the study. These were the hand-operated machines and automated machines, which used electricity. The cost of the hand-operated machine was 160,000.00 cedis. The automated block making machine was sold at 1,200,000.00 cedis. Whilst 50 percent of block manufacturers used both hand-operated and automated machines, those who operated with only the hand-operated machine constituted 20 percent. The rest (30 percent) used only automated machines. Both types of machines were assembled at the Suame Magazine in Kumasi. Other equipment used by the block manufacturer were shovels, buckets, headpans, wooden pallets, mortar mixers and Wellington boots. These were all obtainable locally from the Kumasi market.

Infrastructure

The infrastructure requirement for sandcrete block manufacture comprised workshop structures to accommodate the office and stores to keep raw materials, machines and other working equipment. The other infrastructural needs were electricity, access roads, toilets and bathrooms. The erection of permanent structures at the sites was totally absent since the land on which the producers operated were officially not plots meant for block making. Manufacturers operated under temporary structures. All operators had access to water and electricity. Toilets and bathrooms were lacking and access roads were in a poor condition. The average cost of electricity was 555 cedis per day. The average cost of drawing water from the stand pipes, wells or streams for their work was 1, 245 cedis.

Employment

On average each of the block manufacturers employed 10 persons. In fact, 784 workers were employed by the block manufacturers captured in the study (figure 3). Making sandcrete blocks required less skilled manpower and as a result the majority (61.9 percent) of the workers were unskilled. As labourers kept on working with the machine operators, some of them receive on-the-job training and became machine operators. For most part the workers were engaged in sand winning, truck loading, block packing and preparation of mortar for making blocks. As much as 94.6 percent of the proprietors worked as accountants. For the financial management of their firms 5.4 percent of the owners appointed account clerks to assist them. Table 1 shows the outcast of the various group of workers.

Table 1: **Classification of Workers Employed**

Type of Workers	No. of Workers	% of total No. of Workers
Proprietors	80	10.2
Labourers	486	61.9
Machine Operators	107	13.7
Accounting Clerks	42	5.4
Watchmen	45	5.7
Drivers	24	3.1
Total	784	100.0

Condition of Service

An unfortunate observation made during the study was that only 17 percent of the block manufacturers provided social security for their workers. As much as 83 percent of the workers had no registration with any social security insurance company. Only 13 percent of them provided their workers with medical care and Wellington boots. Medical care and social security insurance were essential to the industry much as it had a high possibility of wound incidence, dust inhalation and electrical accidents. As much as 25 percent of the enterprises reported having an accident every fortnight. Per month, 45 percent reported having an accident.

Income

Most (67 percent) of the workers in the block manufacturers industry received incomes less than the national minimum monthly income of 51,000 cedis. About one quarter (26.5 percent) were on that national monthly minimum wage. Only 7.4 percent received over 60,000 cedis per month (Table 2). The incomes of the workers had to do with their inadequate skills. There was the need to organise the industry,

improve the skills of the workers to ensure their efficiency and productivity. For all the workers the average monthly income was 38,390 cedis. That was 25 percent lower than the prevailing minimum wage of 51,000 cedis per month as at the time of the study. On the basis of that the workers engaged in sandcrete block manufacture could be adjudged as poor if the national monthly minimum wage was taken as the poverty line. Nevertheless, their being engaged in a productive sector of the economy could be appreciated. The problems of the sector needed solution to improve their income and hence their quality of life.

Table 2: Income Distribution

Income	Frequency (F)	%	Mean (X)	FX
<20	29	3.7	10,000	290,00
21 - 40	497	63.4	30,500	15,158,500
41 - 60	200	25.5	50,500	10,100,000
61 - 80	35	4.5	70,500	2,467,500
81+	23	2.9	90,500	2,081,500
Total	784	100.0	-	30,097,500

Production Level

About 23 percent of the block making enterprises produced not more than 200 blocks a day. The majority (70 percent) of them produced between 401 to 800 blocks per day. Only one manufacturer, Adom Super Blocks Limited, produced over 1000 blocks per day. Lower levels of production in the sandcrete block manufacture was attributable to the limitedness of the number of workers at site, raw material availability, space for curing and storage, low working capital, machine inefficiency and low product patronage.

It could be inferred from Table 3 that a total of about 30,000 blocks were produced daily by the 80 producers interviewed. With an average production cost of 400 cedis per block, an average cost of 12 million cedis was incurred daily.

Table 3: Average Daily Production Level

Quantity Produced	No. of Producers	Percentage	Mean (x) (Blocks)	FX (Blocks)
<200	18	22.5	100.0	1800
201 - 400	32	40.0	300.5	9616
401 - 600	24	30.0	500.5	12012
601 - 800	3	3.8	700.5	2101.5
801 - 1000	2	2.5	900.5	1801
1000 +	1	1.2	1100.5	1100.5
Total	80	100.0	-	28431

Distribution

Sandcrete blocks as finished products were packed at the site of production for the customers to come and buy and take delivery of. Whilst 25 percent of the producers served only bulk orders made to them, the rest (75 percent) served bulk and small unit orders. The channel of distribution, which was a direct producer to customer relationship, took forms. One form was that the customer upon the purchase of the blocks carted them with a self provided truck. As an incentive, the producer allotted the customer 20 free blocks for every 100 blocks bought to cater for any breakages. This was irrespective of whether the customer comes from Kumasi or outside.

The second form was that the producers provided the customer with transport and withdrew the 20 additional free block incentive. Outside Kumasi, the customer in addition to losing the additional block incentive provided the producer with enough fuel for a return journey in transporting the blocks between the site of production and that of delivery. Cost of loading was for the producer as cost of unloading was for the customer to pay.

For all producers, advertisement was by way of billboards. It was only Adom Supper Block Enterprise at Kwadaso which advertised on the local Frequency Modulation Station in Kumasi in addition to the billboards. The radius of the reception sphere of influence was 50 kilometres.

Sale of Sand Blocks

The average daily sale of the Sandcrete blocks was used to gauge the rate at which the finished products (blocks) were transferred from manufacturing to consumption sites. It also provided an indication of the enterprises with regard to the progress of work generally. Where daily sales were encouraging daily production tended to increase since producers are able to increase their working capital. On average 22,000 blocks were sold by the 80 block producers. Table 4

That fell about 80,000 blocks short of average daily production level of 30,000 blocks. That explained why there were piles of blocks on their production sites all over the city. In terms of cash the average selling price per block was 500 cedis. The total daily sales of the 80 block manufacturers therefore amounted to 11 million cedis compared to the average daily total expenditure of 12 million cedis. One million cedis worth of blocks was locked up unsold daily by the 80 block manufacturers.

Table 4: Quantity of blocks Sold Daily.

Blocks Sold	Frequency (F) (Blockmakers)	Percentage	Mean (X)	FX (Cedis)
<200	32	40.0	100	3200
201 - 400	36	45.0	300.5	10818
401 - 600	7	8.8	500.5	3503.5
601 - 800	3	3.8	700.5	2101.5
801 - 1000	1	1.2	900.5	900.5
1000+	1	1.2	1100.5	1100.5
Total	80	100.0	-	21624

Utilisation of Sandcrete Blocks

There were three kinds of customers (consumers) in the sandcrete block market in Kumasi and its environs. These included the sector building corporations, private sector contractors and private developers. The corporations included the State Housing Corporation, the State Construction Corporation and Social Security and the National Insurance Trust. The private sector contractors comprised Consar

Limited and A-Lang Limited. The private developers were in the main Ghanaian emigrants working abroad. On their return, they wished to timely see to it that whatever structures they intended to invest in were duly completed before their return journeys. Therefore, they resorted to the use of already made blocks.

About 70 percent of sandcrete blocks made were consumed in Kumasi and its immediate environment. Beyond 10 kilometres but less than 50 kilometres from the centre of the city, 72 percent of the total production is consumed. These included areas such as Ejisu, Konongo, Mampongteng, Abuakwa and Agona. Occasionally, distant places such as Sunyani, Tepa, Techiman and Obuasi were served. They altogether took 28 percent of the total number of blocks produced. In all 52 sandcrete block consumers were captured in the study. The majority (69 percent) of them used the blocks in building commercial facilities such as stores and stalls. Eight percent and four percent of them used the blocks in building industrial workshops and social facilities (schools, clinics and recreational spots) respectively. The rest was used for housing construction.

Sandcrete Block Manufacture and the Environment

The sandcrete block manufacturing industry was observed to have had certain adverse effects on the environment within which it operated. Such impacts included noise pollution, dust inhalation, destruction of vegetative cover, soil erosion and visual pollution. To assess the environmental impact, formal interviews were held with persons associated with block manufacturing and were well informed about the implications of the activities of the industry in the areas of its operation. The sample selected was at random and included within it 40 sandcrete block manufacturers, 40 residents around the production sites and 40 around the sand winning areas. Asked to indicate the most crucial problems associated with sandcrete block manufacture with regard to the environment, a total number of 172 answers were recorded from the respondents. The frequency distribution of the answers were as follows: noise pollution 67 percent, dust inhalation 32 percent, destruction of the vegetative cover 20 percent, soil erosion 26 percent and visual pollution 26 percent. Noise pollution was very acute in the residential areas where automated machines were used. Dust inhalation (or air pollution) arose from the digging, collection and dumping of sand. It occurred at the sites of sand winning and block production. In winning the sand, farmlands and water supply sources were destroyed as the fertile top soils and vegetative were removed. The sand-pits were left unrestored and the water they contained posed not only as physical dangers to humans and animals in their event of falling into them, but as breeding grounds for mosquitoes through which malaria spread and killed people.

SUMMARY OF FINDINGS

PROBLEMS

Raw Materials

Although cement and sand were easy to get in Kumasi, the increase in the prices was rather alarming and left much to be desired. In the case of cement for instance, in 1994 the price of a bag of cement was 4,400 cedis. In 1995, the price increased by 33 percent to 6,600 cedis. As at the time of study (1996) the price of a bag of cement was 8,600 cedis representing an increase of 30 percent over the 1995 price. Considering the commercial interest rates of 15 percent, 23 percent and 29 percent for the respective years of 1994, 1995, 1996, the price increase in the case of the cement was therefore dramatic and spelt a limitation on the investible resources of the entrepreneurs.

Finance

Limited fiscal finance stood as one of the crucial checks to the establishment and smooth operation of the sandcrete block manufacturing industry in Kumasi. Finance which was mostly from personal savings and remittances from friends and relatives was grossly inadequate for the purchase of machinery, equipment, raw materials acquisition and payment of running costs. Institutional credit was available with the banks but the structural characteristics of the block manufacturers did not auger well for them to benefit from it. The banks complained that block makers were unable to afford the seed money of substance to merit their consideration. With an inadequate knowledge about financial matters, they lacked established banking habits. Since their experience in the line of business was limited, their management skills were at best embryonic. They were hardly able to put facts and figures in the form that they could be comprehensible to financiers. In such a situation the financial institutions feared the high cost of maintaining or operating small accounts for them.

Location and Space

All the sandcrete block manufacturers were located on sites not originally planned for them. In that situation, they tended to be incompatible with their surrounding land uses. In the residential areas, where 57 percent of them located, they caused air, visual and noise pollution. Most (93 percent) of the entrepreneurs complained about inadequate space. The size of the plots bore on the volume of production. The smaller the plot the limited the number of blocks that can be produced at a time. Packing of blocks hindered the smooth flow of the production process and made the dumping of inputs and the loading of the finished products difficult.

Infrastructure

The plots on which the sandcrete block manufacturers operated were well served with water and electricity. This was easily understood on grounds that much of the city had been provided with these infrastructures. Toilets, bathrooms were necessary for the convenience of the workers but all sites lacked them. That was because sandcrete block manufacturers on these plots reasoned and accepted that they were on temporary premises and as such provided temporary structures and facilities thereon. The workshops, which contained offices and stores, were wooden constructions, which would be dismantled in the future. Access to production sites was poor.

Workers' Welfare

The average monthly income per worker in the sandcrete block manufacturing industry was about 40,000 cedis. Considering that it was 10 percent lower than the prevailing national minimum monthly income of 51,000 cedis,

one could infer that the workers in the sandcrete block making industry were poorly paid. That was probably due to the unskilled nature of the labour force engaged. Providing social security, medical care and safety precautions at work was inadequate but were essential ingredients of the workers motivation for increased productivity and efficiency

Environment

The environmental problems created by the sandcrete block manufacturing industry were many. They included noise, visual and air (dust) pollution at and around the production sites. At the sources of the sand winning the problems of sand winning were alarming. The removal of trees and the vegetative cover left the soil highly vulnerable to the full forces and potency of the denudation agents of rain and wind.

The intensity with which the sand winning was conducted destroyed the potentials of farmlands, physically endangered the lives of man, birds and animals through the unrestored sand-pits engendered the breeding of mosquitoes in pools of unkept waters and spread malaria and the silting up of community water supply sources. There was no environmentally sensitive plan associated with the sandcrete block manufacturing industry in Kumasi.

PROSPECTS

Population Growth and Urbanisation

The increasing rate urbanisation required commensurate construction works in the centres of growth. These included the building of market complexes, stores and stalls, schools and other educational facilities, hostels, restaurants and related facilities, hospitals, clinics and sanitary facilities, houses and other related residential facilities. Population growth and urban growth therefore provided an enabling environment for building inputs manufacture which included sandcrete block manufacture.

Employment

The manufacture of sandcrete blocks provided employment to entrepreneurs and the poor in the city. On average each manufacturer employed 10 persons. These were people who would otherwise have been idle and outside the productive sector of the economy. Their average monthly income of 40,000 cedis was, however, lower than the national minimum wage of 51,000 cedis but then it helped them to survive.

Production Inputs

Albeit price increases, the raw materials of sand and cement and infrastructure services, which involved electricity and water, were available or accessible to most parts of the city. These offered potentials for entrepreneurs to enter the industry and for existing ones to upgrade and/or expand their businesses.

Education and Research

Block making and masonry had been introduced into the educational curricula of the Junior Secondary Schools in the country. Advanced forms of these subjects were taught in the technical and vocational institutions in the country. In addition to having these educational facilities Kumasi even had the higher institutions of a polytechnic and the University of Science and Technology. The Building and Road Research Institute and the Department of Housing and Planning Research, all located in Kumasi, were all institutions, which research into block making. These offer opportunities for technological innovation for the block making industry in the city.

Credit Facilities

The International Development Association of the World Bank had made available to Ghana a credit facility of 30 US dollars for investment in the productive sectors of the economy (3). Entrepreneurs in the block - making industry qualify for such credit. They only needed group organisation. Advanced efforts were made to establish and tailor community banks towards the administration of credit to small and medium-sized enterprises. The entrepreneurs in the block making industry could also exploit that credit facility.

Policy Environment

The draft National Housing Policy and Action Plan for 1987-90 prepared by the government confirmed the important role the block making industry had been playing (4). The Ministry of Works and Housing started a project with the Building and Road Research Institute to train small-scale contractors in order to enhance their construction capacities. The project was an integrated one and offered prospects to the block making industry in the areas of skills, employment, income improvement and management.

RECOMMENDATIONS

To help minimise the problems facing the block manufacture industry in Kumasi and to enable it to realise as well as utilise the prospects that avail to it, the following recommendation were thereby made on the basis of the findings.

Organised Union Formation

Entrepreneurs were to organise themselves into groups which in a broad perspective constituted an association. The association would serve as conduit to the credit, raw material, technical and entrepreneurship training. The association could also get other forms of assistance from the National Board for Small-Scale Industries and the Kumasi Metropolitan Assembly. The Department of Co-operatives and the Business Advisory Centres of the National Board for Small-Scale Industries were the competent agents that could assist in the union formation of the block manufacturers.

Development of Light Industrial Sites

The Department of Town and Country Planning in collaboration with the Kumasi Metropolitan Assembly should consciously plan light industrial site the distribution of which would benefit the block making industrialists. The designation of light industrial areas would allow for easy cheaper provision of infrastructure which included electricity, water, assess roads and drainage. The scheme would be done in the form of site and services programme whereby plots would be allocated only after the plots had been serviced.

The service agencies such as the Electricity Corporation of Ghana, the Ghana Water and Sewerage Corporation and the Department of Urban Roads were to take charge of their respective services.

Grouping the block making industrialists in area clusters would enable them to share ideas and experience, standardise their products' prices and facilitate infrastructure cost sharing. Tax collection by the Kumasi Metropolitan Assembly and the Internal Revenue Service would be easier for tax evasion would be heavily minimised. The development of light industrial sites would limit the environmental problems to specific selected areas which could be easily tackled.

Ensure Worker's Welfare

The block making industrialists were to provide welfare services to cover their workers. They could register them with the Social Security and National Insurance Trust. They should provide them with the necessary working gear to ensure their safety and provide for them their medical treatment in the event of accidents and other sicknesses. These constituted a way of motivating the workers and help in increasing the efficiency and their productivity. That would help improve the incomes of the firms and the workers as well since an increase of the proprietors would also tend to result in the income of the people working with them.

Ensure Environmental Improvement

Proper environmental management measures needed to be planned and implemented by the relevant agencies. The institutions included the Kumasi Metropolitan Assembly and the Environmental Protection Agency, the Ministry of Lands and Forestry and the Town and Country Planing. A public education on the environment should be held to create an awarenss of the environmental harmony and improvement.

The environmental law enforcement agencies such as the Kumasi Metropolitan Assembly and the Environmental Protection Council had to bring to bear on sand winning contractors. As they removed the top soil, it should be done in such a manner that they later replaced and restored it. The sand winning activities in the Kumasi Metropolitan Area should be restricted to certain demarcated areas to curtail the indiscriminate and illegal activities of the sand winners.

CONCLUSION

In Ghanaian urban centres, the production of building inputs such as sandcrete blocks provided employment and income to the urban poor. Since every development action more or less involved some constructional aspect, the production of sandcrete block played a vital role in the economy. The industry was faced with problems of raw material acquisition inadequate credit to start and run the business, limited infrastructure and locational space. A concerted effort of the block manufacturing industrialists and the relevant institutions connected to the environmental agencies, co-operative effort and urban development stood as the potential ingredient for building input production and utilisation in urban Ghana.

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