



Manual Brick Production: Profiling Akwansosem Bricks Company in Gomoa Akyereko in the Central Region of Ghana

Kofi Asante-Kyei^{1*}, Alexander Addae², Caleb Nii Darku Doodo³

^{1,2,3}Department of Ceramic Technology, Takoradi Technical University, P.O. Box 256, Takoradi
Corresponding Author's email*: kofi.asante-kyei@ttu.edu.gh

Managing Editors

Prof. Daniel Obeng-Ofori

Rev. Fr. Prof. Peter Nkrumah A.

Prof. Kaku Sagary Nokoe

How to Cite: Kofi Asante-Kyei, Alexander Addae, and Caleb Nii Darku Doodo (2023). **Manual Brick Production: Profiling Akwansosem Bricks Company in Gomoa Akyereko in the Central Region of Ghana.** *International Journal of Multidisciplinary Studies and Innovative Research*, 11(3), 1482-1497. DOI: 10.53075/Ijmsirq/09876345335646

Abstract: In Ghana, the role of brick production in the construction industry is significant, yet it remains somewhat overlooked. A survey revealed that manual brick production factories are relatively unknown in the country, despite their substantial contributions to the brick manufacturing sector. Furthermore, burnt bricks as a building material have limited visibility in Ghana, with minimal presence in advertising, such as billboards or major media campaigns within the local community. To address this, this study offers a comprehensive profile of Akwansosem Bricks Company in Ghana's ceramic industry. It delves into the various aspects of brick production, including raw material selection, processing, molding, drying, firing, quality control procedures, and marketing strategies used to target specific markets. The study utilized interviews and observations as data collection methods and selected the company's owner as the study's primary respondent using purposive sampling. It was revealed that the company has adopted specific marketing strategies, including a unique selling proposition (USP), established a strong brand identity, and engaged in networking and participation in industry events to ensure its sustainability. The study also identified challenges faced by the company, such as high firewood fuel costs for firing, difficulties in sourcing suitable clay during rainy seasons, delayed customer payments due to economic conditions, and environmental concerns related to energy consumption and emissions. Nonetheless, the company has plans to supply burnt bricks to various African nations. One of the recommendations is for the government to provide incentives to support manual brick producers in Ghana. Brick factories could also explore modern technology and innovations, and collaboration and information sharing among brick factories through workshops to stay up-to-date with the latest trends in brick production should be encouraged.

Keywords: Burnt bricks, Clay, Production-techniques, and Marketing

1. INTRODUCTION

In Ghana, manual brick production is unlicensed small-scale enterprises and as a result, getting information about these businesses is difficult to come by concerning the operational mode, production processes, and environmental and socio-economic effects on the communities. However, bricks have been proven over the years as the best value and most affordable concerning the total life cycle cost of a building (Danquah et al, 2015). Brick-making is a labor-intensive enterprise, normally carried out seasonally during the dry seasons (Maithel and Heierli, 2008). It is normally practiced in communities along waterfronts and close to clay sources (Twala, 2008). Again, the nearness of production facilities to raw materials as well as the use of cheap instruments and fuel, limits the cost of production, hence increasing profit margins (Cermalab, 2014). The manual brick production enterprise is usually established to create income for the unemployed and inexpert laborers to cater to their families. However, earnings from these activities are averagely below the bottom income bracket due to the challenges faced by manual brick producers in the country (Obeng, 2023).

Danquah et al (2015) characterized burnt bricks as having strength, durability, sustainability, user satisfaction, and affordability. Hence, local brick production could be well developed to help reduce the over-dependence on the importation of about 80% of construction materials to Ghana (Tamakloe, 2012). According to Kazmi et al (2016), the quality of burnt bricks is normally based on factors such as the properties of the raw materials, manufacturing methods, and the burning process applied. It is therefore not surprising that Danquah et al (2015) advocated that the Ghanaian government could help establish manual brick production centers within the districts of Ghana to boost brick production in the country. This would go a long way to promote the usage of burnt bricks in the local construction industries.

In Ghana, the production of bricks plays a pivotal role in the construction industry, acting as one of its foundational pillars. However, despite its undeniable importance, brick production in the country has often operated in relative obscurity, with minimal attention and recognition. A revealing survey conducted by Danquah and his colleagues back in 2015 shed light on this issue. It unveiled the fact that manual brick production factories, which had been quietly churning out the essential building blocks for Ghana's infrastructure, remained largely unnoticed by the broader public. These factories had been silently contributing to the construction sector's growth without receiving the acknowledgment they deserved.

Another significant issue that this survey exposed was the lackluster promotion of burnt bricks as a viable building material in Ghana. Unlike more conventional building materials, burnt bricks failed to capture the public's imagination. Billboards or major media advertisements showcasing burnt brick companies were conspicuously absent in Ghanaian society, further perpetuating their obscurity. It's against this backdrop of challenges and missed opportunities that this study sets out to address. Its primary aim is to rectify these issues by drawing attention to and highlighting the exemplary work of the Akwansosem Bricks Company of Ghana. By doing so, the study hopes to not only promote this specific enterprise but also to serve as a model for other manual brick factories in the country. This, in turn, could contribute to the sustainability and growth of such businesses in Ghana's ever-expanding construction industry. The study is, in essence, a call to action and a spotlight on the unsung heroes of the Ghanaian building sector, the manual brick factories that have quietly shaped the country's infrastructure.

In pursuit of a comprehensive understanding, we aim to meticulously document the intricate production techniques employed by the factory, delving into the intricacies of their manufacturing processes. Furthermore, our objective is to conduct a thorough examination of

the environmental challenges arising from energy consumption and emissions within the factory's operational framework. This will involve a detailed analysis of their ecological footprint, resource utilization, and the potential impact on the surrounding environment.

Simultaneously, our investigative focus extends to the identification of the multifaceted challenges that the brick factory grapples with daily. We will scrutinize not only the technical and operational hurdles but also the socio-economic and regulatory obstacles that influence their business operations. This comprehensive assessment is intended to provide a holistic view of the issues they face.

Lastly, we are committed to a comprehensive evaluation of the sustainability plans and practices adopted by the brick manufacturing company. This assessment will involve an in-depth examination of their green initiatives, energy efficiency measures, waste management strategies, and their overall commitment to environmentally responsible production. Our goal is to gauge the effectiveness of these sustainability efforts and identify potential areas for improvement, contributing to a more eco-friendly and socially responsible future for the company

2. BRIEF HISTORICAL BACKGROUND

Akwansosem Bricks Company, established by Kwabena Obeng in 2019, stands as a testament to his dedication and vision in the construction sector. Approximately four years ago, this company emerged as a response to the increasing demand for quality bricks in Ghana. Kwabena Obeng's journey to this endeavor was paved with experience, having previously worked with five different companies across various regions in the country. These experiences equipped him with valuable insights and expertise that would later prove indispensable in his venture. What began as a humble family venture, with Obeng's two sons and a daughter, has since grown into a thriving business. The company's growth is evident in its employment of around 30 individuals, all working together to meet the rising demand for bricks within the company's catchment area. This expansion is a testament to the company's commitment to providing high-quality bricks and contributing to the construction industry of Ghana. Obeng, as the founder of Akwansosem Bricks Company, attributes much of the factory's success and sustainability to his family. In particular, he highlights the significant role played by a foster child named Nana Kojo Safo Jnr, underscoring the importance of a close-knit team and a shared commitment to the company's mission.

Obeng's discussions about the company's journey, processes, challenges, and future aspirations offer valuable insights into the inner workings of Akwansosem Bricks Company. These insights help illuminate the company's vision and its dedication to achieving its goals. The primary objective of the company is clear: to manufacture and supply an adequate quantity of high-quality bricks to the construction industry in Ghana. This goal is of paramount importance, as the brick manufacturing industry is a vital component of the broader construction sector. It contributes significantly to the infrastructural development of the country, ensuring that the construction industry has a steady supply of essential building materials. Figure 1, which captures the frontal view of the company, serves as a visual representation of Akwansosem Bricks Company's physical presence, reflecting its commitment to the local community and the construction industry as a whole. It stands as a symbol of progress, quality, and dedication to Ghana's infrastructure development.



Fig. 1: Frontal view of Akwansosem Bricks Company, Gomoa Akyereko
(Source: Fieldwork, 2023)

3. MATERIALS AND METHODS

The research in question adopted a qualitative research methodology, specifically employing a case study design to delve into the intricate dynamics of a particular factory. The selection of the sole respondent was a well-considered process, as it followed a purposive sampling technique, which is non-probabilistic. The choice of this technique was made with precision, as the respondent was intentionally singled out based on their alignment with the key criteria essential for the study's objectives, as advocated by Salkind (2008). The case study approach was meticulously chosen due to its capacity to provide a platform for the sole respondent to narrate their personal experiences within the context of the factory. This approach was invaluable in capturing a rich and detailed account of the various situations and their contextual factors, as expounded upon by Sammut-Bonnici and McGee (2015).

To facilitate effective communication and ensure that the respondent could articulate their insights clearly, an interview guide initially drafted in English was thoughtfully translated into the local dialects. In a bid to enhance clarity and preparedness, this guide was thoughtfully provided to the respondent one week in advance of the scheduled interview. The survey was executed during the factory's regular working hours, thereby maximizing the opportunities for in-depth exploration. The interview questions were thoughtfully designed to probe the key aspects related to the factory's operations, encompassing raw material sourcing, production techniques, quality control measures, and distribution methods.

Furthermore, the interview process was meticulously managed to create an enabling environment, one that encouraged the free expression of the respondent's thoughts and views. This approach, as suggested by Cohen et al. (2018), played a pivotal role in allowing the respondent to share their insights openly and candidly. Within the factory, a diverse array of tools and materials was put to use. This included clay, kilns, shovels, wheelbarrows, molds, and air dryers, each of which played an integral role in the production process. They facilitated the extraction, shaping, and drying of the clay, forming the backbone of the factory's operational workflow. Data obtained through the interview about the company's stages of brick production had been transcribed and grouped under various headings as stated in Table 1 and subsequently explained.

Table 1: 5 States of Manual Brick Production at Akwansosem Bricks Company

Clay (raw material) prospecting	→	Preparation (seasoning and mixing)	→	Molding	→	Drying	→	Firing
---------------------------------	---	------------------------------------	---	---------	---	--------	---	--------

1. Prospecting for clay, a fundamental raw material in the construction industry, is a labor-intensive activity that involves the excavation of soil layers, encompassing the removal of topsoil. This practice is typically carried out in areas adjacent to riverbanks. However, when conducted without proper care and consideration, it can result in significant environmental consequences, including deforestation and the degradation of the surrounding ecosystem (Asante-Kyei and Addae, 2016). Additionally, this prospecting process can lead to the unintentional depletion of fertile topsoil, which has repercussions for brick production (Kanabkaew and Buasing, 2015).

The initial step in this endeavor is the identification of suitable clay sites with the necessary quality for brick production. The proximity of the clay deposit to the earth's surface plays a pivotal role in determining its suitability. Clays with high iron content that are found close to the surface are particularly prized for their use in making tiles and bricks due to their desirable characteristics. Once a suitable clay deposit is identified, it is excavated and transported to the designated worksite. This transfer can be accomplished using various means, such as wheelbarrows or trucks, as illustrated in Figures 2 and 3. The manual process of clay prospecting, while essential for the construction industry, must be carried out with environmental considerations in mind to mitigate its potential negative impacts and ensure the sustainable utilization of this vital raw material. The careful selection of clay sites and the responsible extraction and transport of clay are all crucial steps in preserving the environment while meeting the demands of the construction sector.



Fig.2: Depositing of clay using wheelbarrow Fig.3: Clay deposits at the factory site
(Source: Fieldwork, 2023)

2. Preparation – it deals with mixing the lump of clay with water to form a homogenous consistency before molding the bricks. The wet clay is then protected with a plastic bag and left for some time to enable the prepared clay to age. Prospected clay is exposed to natural weathering conditions for several months. This process allows rain, sunlight, and wind to break down organic matter and reduce excess moisture. Seasoning or aging enhances the clay's workability, plasticity, and overall quality. It also minimizes the risk of cracks and warping during drying and firing. Mixing the seasoned clay with other materials is crucial to achieve the desired properties. Additives like sand and organic matter can be added to enhance plasticity, reduce shrinkage, and improve firing characteristics. The clay is kneaded continuously for about an hour by the brickmakers using bare feet. The purpose of the kneading is to remove all unwanted materials and air bubbles from the clay, and also to facilitate smooth moulding of bricks.

3. Moulding – it is the act of shaping and sizing the clay into wet bricks through molds. Moulding can also be termed as the shaping of raw clay into brick by hand or by using a mechanical extruder (Weyant et al, 2016). The company employs the rectangular-shaped metallic brick mold. The molded bricks' quality starts with careful molding as well as proper placement and compartments of clay to ensure even distribution and eliminate air pockets. The mold is partitioned into 3 parts with approximate dimensions of 9cm x 12cm x 70cm. In the molding process, the prepared clay is poured into a wet mold, filled, and leveled by using a shovel. The filled mold is transported to already prepared level ground normally dried area. The mold is overturned gently to let out the wet bricks. It must be noted that the emptied mold is washed in water after every use, before refilling to remove the hanging clay mixture and also prevent deformity of the successive batch of wet bricks. At times, the molds are coated with sand to prevent sticking (Dalkilic and Nabikoglu, 2017).

4. Drying – it is a process in brick manufacturing when wet bricks are converted into dry bricks. The conversion is facilitated by the evaporation of physical water from the wet brick. In the company, wet bricks are dried in an open space at the mercy of the weather for the sun and wind ((Weyant et al, 2016). Usually, wet bricks get dried on quickly when the weather is sunny and windy than when it is cloudy. According to Obeng (2023), it takes between 5-10 days to dry the bricks when the weather is hot while 6 – 12 days are needed when the weather is cloudy. After about 3 days of exposure of the molded bricks to sunlight for drying, the drying bricks are rotated to ensure further drying of various parts of the bricks. When the bricks are dried enough, they are packed and arranged using the header bond pattern on a dry leveled ground (open shed) as shown in figures 4 and 5 awaiting arrangement for the clamp kiln (Aniyikaiye, et al, 2021).



Fig. 4: Drying of molded bricks in an open shed
(Source: Fieldwork, 2023)



Fig. 5: Dried bricks being carried to be fired in a clamp kiln
(Source: Fieldwork, 2023)

5. Firing – in brick production, firing is the process of heating the dried bricks to harden and increase the durability of the bricks (Aniyikaiye, et al, 2021). At Akwansosem Bricks Company, the main source of fuel for firing bricks are firewood. According to Obeng (2023), the amount of fuel used for firing depends on the weather season – during the rainy season, there is an increase in fuel usage while it is reduced during the dry season. The company produces an average of 20,000-40,000 bricks monthly depending on the demands of customers. Before firing, the dried bricks are organized into a temporal pyramidal structure termed a ‘clamp kiln’ on a dry leveled ground. Akwansosem Bricks Company has assumed 5 processes to fire bricks. These were:

(i). Hacking - it includes the packing of dried bricks into the clamp kiln. The dimension and size of the clamp kiln depend on the available dried bricks to be fired. The dried bricks are packed into a clamp kiln by employing the ‘English bond pattern’ – bricks normally piled up and omitting rectangular portions known as ‘fireboxes’ of about 60cm x 45cm. The clamp kiln is usually constructed with 2 to 4 big fireboxes through to the opposite side of the kiln. There is also smaller fireboxes depending on the dimensions of the kiln. The big fireboxes are used as entrances for both big and thin logs of wood while pieces of wood are placed in the small fireboxes. The ‘English bond pattern’ of brick arrangement is done until the required height of the clamp kiln is achieved as seen in Figure 6.



Fig. 6: Packing of dried bricks to form clamp kiln
(Source: Fieldwork, 2023)

(ii). Laying of protective layer – it takes place after the construction of the clamp kiln. The entire outer layer of the kiln is covered with previously fired pieces of dried bricks to preserve heat during the firing process and sealed with clay mortar (Cermalab, 2014). It takes about 2 to 3 days to plaster the clamp kiln depending on the size of the kiln. The plastering is done with the bare hands. This process is completed before ignition takes place.

(iii). Firing – this is the heating process in which fire is applied or ignited to the dried bricks within the clamp kiln. The combustion process normally starts from fireboxes located in the wind direction. The kiln is completely sealed with a protective cover about 24 to 48 hours after starting the combustion. The kiln is then allowed to combust for a period and when it gets to its peak, smoke and heat emerge from the top and walls of the kiln. When the heating temperature reaches the peak, the dried bricks begin to pass through the following phases: the bricks are liquefied → expanded →, and solidified as the temperature begins to decrease. It must also be noted that features like tensile strength, resistance to heat, and mechanical stress are fused into the bricks during this conversion process (Aniyikaiye et al, 2021). The firing begins from the lower temperature from 0 to 1400 °c and it takes 6 days and 6 nights continuously firing over several weeks the bricks would be fired.

(iv). Cooling – this is the situation whereby the kiln’s temperature is allowed to reduce after the firing process has been completed. According to Obeng (2023), it takes between 2 to 3 days to cool the burnt bricks. After the firing the bricks were left for about 4 days to cool down.

(v). De-hacking - it is the process of unloading the burnt bricks from the kiln. Thus, de-hacking involves packing the burnt bricks from the kiln for sale or storing them in a cool dry place. Afterward, the bricks would be offloaded from the clamp kiln. Physical inspection of the burnt bricks was carried out by critically examining the surfaces of the bricks for any visible cracks and also for sorting out well-burnt bricks ready to be on the market for sale as seen in Figure 7.



Fig. 7: Sorting of well-burnt bricks at the company’s site
(Source: Fieldwork, 2023)

4. RESULTS AND DISCUSSION

The study conducted a comprehensive analysis, shedding light on the pressing environmental concerns stemming from the emission of gases such as carbon dioxide (CO₂), carbon monoxide (CO), and various other pollutants during the brick-firing process. These emissions, in addition to posing a direct threat to the environment, had far-reaching consequences on public health.

The contaminants released into the atmosphere could lead to a myriad of health issues, including asthma and cardiovascular diseases, affecting both the surrounding community and the well-being of the workers involved in brick production. Despite these significant environmental challenges, the study also unveiled a range of astute business strategies and sustainable practices adopted by the company to ensure its long-term success and minimize its ecological footprint.

a) Marketing Strategy - As elucidated by Obeng (2023), a cornerstone of the company's marketing approach involves a deep understanding of its target audience. This audience included a diverse spectrum of professionals, from builders and contractors to architects and construction companies, as well as individuals engaged in construction projects. Through a meticulous understanding of their preferences, needs, and the specific challenges associated with selecting bricks for construction, the company implemented rigorous quality control measures to guarantee customer satisfaction. This dedication to client needs not only contributed to the company's resilience but also reinforced its reputation in the industry.

b) Unique Selling Proposition (USP) - Obeng (2023) underscored the critical importance of establishing a Unique Selling Proposition. The company's bricks stood out in the market due to their remarkable attributes, including superior quality, exceptional durability, unique and innovative designs, and a strong commitment to eco-friendliness. This distinctiveness not only gave the company a competitive edge but also significantly influenced customer decision-making, making it the go-to choice for discerning clients.

c) Cultivating a strong brand identity - Akwansosem Bricks Company recognized the value of building a strong brand identity. As detailed by Obeng (2023), the company implemented a creative pricing strategy that incentivized customers based on the number of bricks required, ensuring consistency in demand. This approach not only built brand recognition but also fostered trust among their target audience, enhancing the company's sustainability and reputation within the brick production sector.

d) Networking and industry engagement - The company's commitment to establishing and nurturing relationships within the construction industry was underscored by Mr. Obeng's active participation in industry events, workshops, and trade fairs. These venues not only provided opportunities to showcase their products but also served as valuable platforms for building connections with architects, contractors, builders, and other key industry professionals. This network facilitated a broader reach and a more prominent presence in the market, strengthening the company's position and long-term sustainability.

Challenges facing the Akwansosem Bricks Company

The company faced challenges such as: a) adverse weather affecting drying- the company relies basically on the natural weather conditions. Thus, the drying process was left at the mercy of the weather. Drying of the wet bricks per period was greatly influenced by the prevailing weather conditions. Mostly, bricks got dried on time on sunny periods while the drying period was delayed on cloudy periods. On rainy seasons, molded and dried bricks were tactically covered with polythene bags to prevent the bricks from soaking in the rainwater. Therefore, brick production took a longer period in the rainy season as compared to the dry season.

b) Excessive firewood expenses for the firing process were a significant burden as the company heavily relied on wood logs as its primary fuel source. These costs surged during the rainy season due to the increased demand for firewood caused by cold weather, thereby raising production expenses compared to the dry season. The company's dependence on wood logs for fuel was driven by their abundance and affordability, but this practice became less cost-

effective when the rainy season set in. The cold and damp conditions during the rainy season necessitated higher quantities of firewood to maintain optimal firing temperatures, and this, in turn, had a direct impact on the company's bottom line. The increased firewood costs resulted in a significant financial strain, as the company needed to allocate more resources to meet its energy requirements. This financial strain, in turn, affected the overall cost of production, making it less competitive and challenging to maintain profitability, especially during the rainy season when demand for their products was still substantial.

c) Securing suitable clay during the rainy seasons presented another formidable challenge for the company. The arduous process of extracting raw clay was exacerbated by the muddy and slippery conditions at the deposit sites, resulting in diminished clay yields from mining operations and subsequently reduced materials available for production. Clay is a fundamental raw material in brick production, and its scarcity during the rainy season impacted the company's manufacturing capacity and efficiency. The slippery and muddy conditions made clay mining a physically demanding and time-consuming process. This directly affected the quantity of clay the company could extract and utilize in brick production. The reduced availability of clay meant that the company had to either reduce its production output or incur additional costs in sourcing clay from alternative, less convenient locations. Either way, it added to the operational challenges and expenses faced by the company during the rainy season.

d) The company faced delayed payments from customers due to the prevailing global economic difficulties, particularly in Ghana. Some customers who purchased burnt bricks on credit struggled to meet their payment obligations promptly, impacting the company's financial stability. The global economic hardships, which extended their reach to Ghana, had a cascading effect on the company's financial health. With the economic conditions creating uncertainties and financial constraints for businesses and individuals alike, some customers who had purchased bricks on credit found it challenging to honor their payment commitments as agreed upon. This delayed inflow of funds strained the company's cash flow, affecting its ability to cover operating expenses, invest in growth, and maintain financial stability. In essence, the economic challenges not only affected the customers but also had a direct impact on the company's ability to manage its finances effectively.

e) Capital constraints prevented the company from actively promoting its products through various media channels such as print, radio, television, and digital platforms. This limitation hindered the company's ability to reach a wider audience and, consequently, adversely affected its sales. Effective advertising is instrumental in expanding the customer base and introducing new products, and the company's inability to invest in regular advertising had a direct impact on its market presence and sales performance. Advertising serves as a critical bridge between the company and its potential customers, helping to create awareness about its products and their unique features. By not being able to engage in consistent advertising, the company missed out on opportunities to engage with its target audience, showcase the benefits of its bricks, and build brand recognition. This, in turn, resulted in reduced customer acquisition and hindered the company's capacity to grow its market share, ultimately impacting its overall sales and revenue.

5. FUTURE PLANS OF THE COMPANY

Following the insights presented by Obeng in 2023, the company has set forth a visionary plan for its future expansion. This strategic initiative revolves around embracing cutting-edge technological trends in the domain of machinery and equipment. The objective is to significantly augment the scale of their production operations in the foreseeable future. This

growth trajectory is underpinned by a profound commitment to addressing a pressing social issue: unemployment. By expanding its production capacity, the company aims to create a substantial number of job opportunities, effectively contributing to the alleviation of unemployment in the local community. Furthermore, this forward-thinking enterprise is not solely focused on increased production but also sustainability and environmental responsibility. Research endeavors are underway to investigate innovative methods of recycling damaged or discarded bricks, thereby transforming them into valuable, eco-friendly products. This eco-conscious approach not only supports the company's sustainability goals but also plays a pivotal role in contributing to a greener, more environmentally responsible industry. To fulfill their ambitious plans, the company is actively exploring opportunities to expand its market presence. The intent is to extend its reach and supply high-quality burnt bricks to a broader customer base spanning various African nations. This geographical expansion not only underscores their commitment to growth but also positions them as a significant player in the African building materials market, offering quality products to meet the construction needs of diverse communities. Obeng's (2023) report sheds light on the company's multifaceted vision for the future, encompassing technological advancement, job creation, sustainability, and market expansion. It illustrates the company's holistic approach to growth, aiming not only to bolster its success but also to make meaningful contributions to local economies and the broader environmental landscape.s.

6. CONCLUSION AND RECOMMENDATIONS

The comprehensive study conducted successfully unveiled the intricate profile of Akwansosem Bricks Company, nestled in the heart of Gomoa Akyereko within Ghana's Central Region. This in-depth exploration illuminated the captivating journey of this remarkable company. Akwansosem Bricks Company, in its unwavering commitment to surmounting adversities, has etched a legacy marked by its relentless pursuit of producing high-quality bricks and its forward-thinking plans for the future. These findings underscore the profound impact this company has the potential to exert, not only on the local community but also on the broader society in Ghana.

Furthermore, the study's discerning insights have brought to the forefront a crucial aspect of sustaining manual brick production, exemplified by Akwansosem Bricks Company. The government of Ghana plays a pivotal role in ensuring the continued success of enterprises like these. Therefore, it is strongly recommended that the government engage in collaborative efforts with industry stakeholders to critically review and update the regulatory framework that governs brick factory operations. This revision should encompass a holistic approach, focusing on simplifying and expediting permission processes, guaranteeing strict adherence to environmental standards, and facilitating transparent communication channels between regulatory bodies and brick manufacturers. Creating an environment of cooperation and understanding between these entities is key to establishing a regulatory framework that is conducive to the efficient operation of brick factories. Such a framework not only bolsters the local economy but also ensures that these vital businesses operate following the highest standards and best practices. This collaborative approach holds the promise of a sustainable and thriving future for brick manufacturing in the region, and, by extension, the nation.

Environmental sustainability initiatives - Brick factories have a significant environmental impact, particularly in terms of energy consumption and emissions. To address this, the government could provide incentives and support the adoption of cleaner technologies and energy-efficient practices, offering grants, tax incentives, and subsidies for the implementation

of eco-friendly kilns, energy recovery systems, and waste management solutions to reduce the carbon footprint of the industry and improve air quality.

Technological advancements and innovation - Encouraging brick factories to adopt modern technology and innovation will improve efficiency, quality, and competitiveness. The government should establish research and development grants to encourage the development and utilization of advanced production techniques, automation, and digital systems. This will not only boost productivity but also position the industry as a leader in sustainable construction materials.

Workforce development and training - Investing in workforce development is crucial for the long-term growth of the brick manufacturing sector. The government should collaborate with educational institutions to offer specialized training programs in brick production, quality control, and environmental management. This will enhance the skills of workers, promote job stability, and ensure the availability of a skilled workforce to meet industry demands.

Market Expansion and Export Support - To bolster the brick manufacturing sector, the government should facilitate market expansion and export opportunities. This could involve trade agreements that provide access to new markets, as well as support for participating in international exhibitions and trade fairs. By promoting locally manufactured bricks on a global scale, the industry's visibility and revenue potential will increase.

Collaboration and information sharing - Creating a platform for collaboration and information sharing among brick factories, government agencies, research institutions, and industry associations. Regular forums, workshops, and conferences will enable knowledge exchange, dissemination of best practices, and the identification of emerging trends and challenges and address challenges faced by entrepreneurs.

REFERENCES

- Aniyikaiye, T. E., Edokpayi, J. N., Odiyo, J. O. and Piketh, S. J. (2021). *Traditional Brick Making, Environmental and Socio-Economic Impacts: A Case Study of Vhembe District, South Africa*. Sustainability, 13, 10659. <https://doi.org/10.3390/su131910659>
- Asante-Kyei, K. and Addae, A. (2016). *The Economic and Environmental Impacts of Clay Harvesting at Abonko in the Mfantseman West District of Central Region, Ghana*. American Scientific Research Journal of Engineering, Technology and Sciences. 18 (1), pp 120-132.
- Cermalab, C. C. (2014). *Survey of the Status of the Informal Brick-Making Sector Eastern Cape, South Africa*. Pretoria, South Africa. Pp 1-83.
- Cohen, L., Manion, L., and Morrison, K. (2018). *Research Methods in Education* (8th edition). London. Routledge. <https://doi.org/10.4324/9781315456539>
- Danquah, J. A., Abrokwah, P. O., Twumasi, A and Ankrah, J. S. (2015). *Appraisal of Burnt Bricks as a Building Material in Ghana*. International Journal of Scientific Research and Education (IJSRE). Vol.3 Issue 1.
- Kazmi, S. M. S., Abass, S., Munir, M. J and Khitab, A. (2016). *Exploratory Study on the Effect of Waste Rice Husk and Sugarcane Bagasse Ashes in Burnt Bricks*. Journal of Building Engineering. Vol. 7. Pp 372-278.

- Maithel, S. and Heierli, U. (2008). *Brick by Brick: The Herculean Task of Cleaning up the Asian Industry (1st edition)*. Osborn, P, Ed. Swiss Agency for Development and Cooperation (SDC). Natural Resource and Environmental Division. Berne, Switzerland. pp 1-132.
- Obeng, K. (2023). *Manual Brick Production in Ghana*. [Interviewer; Kofi Asante-Kyei; Interviewee: Kwabena Obeng, Owner of Akwansosem Bricks Company] [Interview Date: 02/02/23]
- Tamakloe, W, (2012). *Initiate Research to Promote the Use of Local Materials in Buildings*. Retrieved from: <https://www.newtimes.com.gh/story/initiate-research-to-promote-use-of-local-materials-in-building>. [Accessed Date: 28/08/23]
- Salkind, N. J. (2008). *Exploring Research. (6th edition)*. New Jersey: USA. Prentice Hall Inc.
- Twala, N. S. (2008). *Overview of South Africa's Clay Brick Industry*. Directorate: Mineral Economics; Report R73/2008; Mineral Resources. Republic of South Africa. Pretoria, South Africa.
- Sammut-Bonnici, J and McGee, J. (2015). *Case Study*. Retrieved from: <https://www.researchgate.net/publications/257847801> [Accessed Date: 31/08/2023]
- Kanabkaew, T., and Buasing, K. (2015). *Assessment of Air Pollution Concentrations from Kilns using an Atmospheric Dispersion Model*. Ecol, Environ. 198, pp 27-37.
- Dalkilic, N and Nabikoglu, A. (2017). *Traditional Manufacturing of Clay Brick used in the Historical Buildings of Diyarbakir (Turkey)*. Front Archit. Res.6, 346-359.
- Weyant, C., Kumar, S., Maithel, S., Thompson, R., Baum, E., Floes, E., and Bond, T. (2016). *Brick Kiln Measurement Guidelines: Emissions and Energy Performance*. University of Illinois, Urbana-Champaign Civil and Environmental Engineering and Greentech Knowledge. Champaign IL. The USA. Solutions Pvt. Ltd