KARELIA UNIVERSITY OF APPLIED SCIENCES
Degree Programme in International Business

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ESTABLISHING WOOD POLE TREATMENT PLANT IN GHANA

Thesis
August 2014

Karelia
UNIVERSITY OF APPLIED SCIENCES

THESIS
August 2014
Degree Programme in International Business
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Abstract

The main aim of this study is to assess the possibilities and practicalities of setting up a wood pole treatment plant in Ghana by Iivari Mononen Oy (commissioning company). The rising investment opportunities in Africa has attracted large foreign investments. In the power sector, demand for poles will continue to rise due to the low rate of electricity, wood supply gap, rising population and high rate of urbanisation. Ghana's is used as a case study to unearth critical issues when establishing a treatment plant in sub-Sahara Africa.

The execution of this study comprised of telephone interviews with representatives of existing treatment plants in Ghana, staff of the Ghana Forestry Commission as well as analysis of secondary data. There were also discussions with staff of Iivari Mononen Oy in addition to the study of internal company documents.

The outcome of the study is a strong indication of the need for Iivari Mononen Oy to boost sales and other activities that will earn a market share in the increasing power transmission and distribution market in Africa. Entering the African market first with the company's subsidiary Exsane Oy needs to be given a careful consideration. Operating in a distant continent and culture with such high investment requires a great amount of trust, precise and detailed market information. Corruption still remains a challenge that needs to be well managed. The need for preliminary actions is recommended before entry.

Language	Pages 43
English	Appendices 5
	Pages of Appendices 17

Keywords

wood poles, wood treatment plant, Ghana, electricity transmission and distribution

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APPENDICES

1 INTRODUCTION

1.1 Background

The African business environment is witnessing significant improvements, and this has attracted the interest of international companies. As reported by the Economist (2013), African markets are juicy and has attracted both investors and multinational companies that have observed the growth rate of gross domestic product (GDP). The report continued to emphasize that the GDP growth rate for most sub-Saharan African countries hovered around 5% over the past three years. This is subsequently evidenced by the number of African countries (60%) ranked in the top ten economies with the fastest growth.

Confirming the reported economic growth experienced by African economies, McKinsey and Company (2012, 2-3) sheds more light as to why the trend will continue into the future. It forecasts that in about eight years henceforth, the majority of African households will have much-improved income. Additionally, over half of the continent's populations which are aged, under 20 years gives strong signals that by the next thirty years, Africa will have more working-age population than China. These bring about increased rate of urbanisation and other repercussions. One is the increased demand for energy and energy utilities.

Unfortunately, the current state of energy, mainly grid electricity, supplied to sub-Sahara Africa (SSA) is woefully inadequate. Statistics from the World Bank estimate an average electrification rate of 29% for SSA in 2009, (World Bank 2010, 8). For companies that produce goods and services in the electricity transmission and distribution sub-sector, this presents an investment opportunity.

Taking cognisance of the improved economic situation in African countries as well as the needed electricity infrastructure, Iivari Mononen OY (IMOY) decided to gather information about the African power and electricity market. IMOY started out as timber Production Company around 1952. The head office is in Joensuu. There are two treated pole production plants. The first is in Höljäkkä, about 135 kilometres from Joensuu. The other plant is in Ilseng, Norway. Four acquisitions have been made since 2002, the latest is

Exsane Oy. Exsane provides maintenance, inspection, clearance, design of power distribution, telecommunication and outdoor lighting networks. (Iivari Mononen Oy, 2014.)

IMOY owns a subsidiary in Norway, a sales company in the UK and two sales offices in Sweden and Germany. The company's high-priority export destination is in the Middle East, North Africa and Western Europe. Out of the annual turnover of over 30 million euros, 77% came from international sales. The company employ 66 people. Combined treated pole production capacity is 60,000m^3, total volume of wood pole sales for the past year amounted to about 42,000m^3, i.e. 140,000 poles (1 Pole = 0.3m^3).

Reason for choosing Ghana

A previous study (commissioned by IMOY) confirmed market opportunities in all 25 countries assessed in the study. Certain factors that impact on international trade with these countries meant all countries do not offer the same market potentials (Adaam 2013). For example, if a relationship is to be established between current electrification rates vis a vis the demand for utility poles, then it may be safe to say countries like Uganda offer better market opportunities. The country has a very high population of which only about 13% has access to electricity. Although this may hold in some instances, it cannot always be true. Factors like demand and safe operation of a treatment plant in a foreign country affects the market potentials. A subsequent study was thus later conducted to identify countries with higher potentials (Adaam,Penttinen,Medvedeva,Salgado &Teresschenko, 2014). After a scrutiny of each country based on set indicators, Angola and Ghana had the best market potentials. The final analysis concluded that Ghana was, however, slightly above Angola. (Adaam, et al 2014).

A subtle reason for the choice of Ghana is because the author's familiarity with the Ghanaian market. Obtaining information is much easier. The Ghana report will thus serve as a template that will expose critical issues when establishing a treatment plant in a SSA country.

1.2 Aim of the study

This study aims to turn up relevant market information related to wood pole treatment plant in Ghana. It all begun from internship at IMOY during which the author conducted a study on the African electricity market (Adaam 2013). That study analyzed the African electricity market in 25 countries for potential investment opportunities. The report highlighted key areas of interest about the electricity or power market in the selected Africa countries and offered a general overview about power markets. The choice to establish a treatment plant in Ghana over options like export is because of profitability. The costs involved in treating a pole in Finland would not make the price competitive enough when exported to the Ghana market.

1.3 Research methodology

Data for this study were obtained through primary and secondary sources. Primary sources included telephone discussions with officials of treatment plants in Ghana and other governmental agencies. Secondary sources were mainly through online databases and official documents, including that of IMOY.

1.4 Outline of the report

The content of this report, firstly, considers the wood pole business and its profitability. A PESTEL analysis of Ghana business environment is made prior taking specific look at the Ghana timber industry. The wood pole sub-sector is mentioned in the discussion. The final part of the report discusses the main objective of the study - specific issues about establishing a wood pole treatment plant. Conclusions and recommendations are then made about the way forward for IMOY.

1.5 Wood pole business

In spite of the availability of options for the transmission and distribution of electricity, wood poles remain the most preferred. Experts are of the view that although other options may have fair share of the market, wood poles will dominate. If any changes should happen, the pressure will rather come from underground cables. (Transmission & Distribution 2010.)

According to Western Wood Preservers Institute (2003, 1-2), treated wood poles are the market leader in lower voltage transmission and distribution utility poles. Not only because it is cheap, but because over 100 years treated wood poles proves to be most reliable with high-quality performance. Since cost of production is most of the times the top consideration when establishing electrical networks, wood will continue to dominate. Apart from cost, even when other factors like performance life, post-construction expenses for inspection, maintenance, repair, replacement and disposal are examined; wood poles still reign.

A further enthralling reason wood poles are preferred is environmental friendliness. Wood resources are harvested from nature and in properly managed forests, the renewability can continue for a long time. As such, harvesting wood does not pose significant threat to the environment. After harvesting, they are impregnated with chemicals through a simple process at the treatment plant. The amount of energy used, and the emissions to the environment is one-quarter to one-tenth for steel, plastic or concrete (Smith 2007,5-6.)

Production process of treated wood poles

The pole production process at IMOY can be described in five main steps

- Debarking: At the initial stage, newly harvested poles from the forest that arrive at the treatment plant are debarked. The debarked poles are then sorted by use of a laser technology into varying customer specifications and grades. The waste from this stage is used to fuel a bio power plant on site.

- Drying: The debarked poles are stacked in the open air according to grades or customer specification to dry. Depending on the size of the pole and weather conditions, open air drying can last from eight months to one year. Open air drying has been the traditional method, there now exist other technologically advanced method of drying to shorten the drying time between 7 to 10 days. These alternatives include the use of vacuum chambers, warm-air kilns or high-temperature kilns.

- Dressing: This is the stage the pole is subjected to peel to remove the inner bark in order to make the surface smooth and even.

- Fabrication: In this phase, all customer specifications are executed before finally treating the pole. Examples are pole markings, drilling and any other fabrication required by the customer. Pole dimensions, moisture content and quality are also checked in accordance with acceptable standards.

- Impregnation: The poles are treated with chemicals that will prevent the poles from insect attack and to last longer. Depending on customer specifications, the treatment chemical used could vary between creosote and copper. The finished product (treated pole in Figure 1) is then prepared for delivery to the customer. (Iivari Mononen Oy, 2013.)

Figure 1 : treated wood poles at the yard of Höljakka production plant

Profitability of operating a wood treatment plant

The wood pole business is a profitable one and can make up about 20% of the sales price per pole. A report by the Department for International development about the official cost structure for treating wood poles in SSA moderately estimates a profit component of about 17%. The study used the South African wood pole market which is undoubtedly the most advanced and biggest wood pole market in Africa. The estimates given are listed in Table 1.

Table 1: Cost structure for wood treatment plants

COST ITEM	**%**
Raw Material	25
Treatment Chemicals	26
Salaries and Wages	7
Other Expenses	9
Overheads	16
Profit Margin	17
TOTAL	**100**

A cross check of this cost structure with internal data of IMOY gives a form of authentication due to the similarities observed. Respective percentages of raw materials and chemicals gives a clear indication of how critical they are to the treatment of wood poles (Water and Foresty 2005, 2). Data from Ghana proves the business can be more profitable. For example, a 20% moisture content pole imported from Argentina at a cost of US$ 150 could be sold for US$300 after treatment (Boakye 2014).

2 GHANA AS A BUSINESS ENVIRONMENT

This chapter will explore the Ghana business environment using PESTEL dimensions to assist in addressing factors that will influence the operations of the planned treatment plant. The PESTEL analysis will be preceded by a brief description on Ghana's geography.

2.1 Geography of Ghana

Ghana is situated among other countries that have been spearheading SSA culture since the first millennium BC in areas like metal work, mining, sculpture and agriculture. The Gold Coast's was the first British colony to secure self-government in 1951. It attained political independence in 1957 after which the former name Gold Coast was changed to Ghana. (KPMG 2012, 10.) Ghana's neighbouring countries to the north, east and west are Burkina Faso, Togo and Côte d'Ivoire respectively as shown in figure 3. In the south, Ghana is bordered by the Atlantic Ocean. The total land area is 227,540 square kilometres. The capital is Accra, located in the south. Administratively, the country is divided into 10 regions, spread across 216 districts. (OBG 2013.)

Figure 3: Location of Ghana on the African map (Source: GIPC 2014)

Logistics and transport

Ghana has two sea ports located in Tema (Eastern Coast) and Takoradi (Western Coast), managed by the Ghana Ports and Harbours Authority (GPHA). The Tema port which is the biggest has 12 berths with depth range of 8.0 to 11.5 meters. The Takoradi port, on the other hand, has six berths with depth ranging from 5.5 to 11 meters. Takoradi ports' interconnection to the hinterland makes it the preferred port for cargo that needs to further transportation to the central and northern parts of the country and the neighbouring countries in the north. As at 2013, there were over 20 shipping line and agencies operating in Ghana. International shipping lines like Maersk, MOL, MSC and Hanjin all operate in Ghana. (WFP 2011, 13.)

The road network in Ghana can be described as quite well; it connects major cities to towns and villages. Apart from these local routes, there are also roads that link the country to neighbouring countries like Burkina Faso and Mali that patronizes Ghana's ports. The railway network, although existent is not effective. They are confined to the south. The northern-most part reaches Kumasi far away from the centre of the country. (WFP 2011, 31.)

Kotoka International Airport is the only international airport in Ghana located in the capital of Accra. There are air strips in Kumasi, Sunyani and Tamale that are mainly used for domestic flight. Ghana does not have navigable rivers, although there is transportation on the Volta Lake. Storage and warehousing facilities in the country are appreciable. Several of these, both government and privately owned are located especially in Tema and areas in the north. These storage facilities are, however, lacking at the Takoradi port. (WFP 2011, 39-41.)

2.2 Political factors

A relatively stable and predictable political environment is what Ghana offers to investors. The country's enviable democratic practice was once again exhibited through the successful completion of democratic elections in December 2012. Despite the losing party disputing the Presidential election, the Supreme Court which handled the petition upheld the victory of the National Democratic Congress's John Dramani Mahama. Even

though many investors were reserved about Ghana during the petition period, the country maintained its status as a beacon of democracy. There was no turbulence or violence associated with the elections or the disputed result. The main opposition New Patriotic Party accepted the Supreme Court's ruling and is participating in the Parliament. President Mahama's term will end in 2016. Based on this accomplishment as well as previous successful election, the political environment in Ghana is expected to be quite stable in the foreseable future (USDS 2014,12-13.)

2.3 Economy

The recorded GDP for Ghana in 2013 was $47.93 billion representing a growth rate of 7.1%, World Bank (2013). The economy is made up of three sectors – agriculture (22%), services (49.5%) and industry (28.5%). (GSS 2014, 3). Available fiscal data ranks Ghana's economy as one of the best-performing economies in Africa – and to a larger extent, the world. While growth may have trimmed a little in 2013 due to international factors, it remains comparatively high, driven by capital inflows largely from the oil sector. The World Bank (2014) predicts Ghana's economy to grow by 7.4% in 2014 (LCHL 2014). The Bank's growth projection falls between predictions by the government and IMF at 8% and 6.1% respectively (IMF 2014, 69).

Despite the positive projections, Ghana's economy in June 2014 was described as a total mess. According to The Statesman newspaper (2014), the Minister of Finance was exploring the possibilities of bail out from the IMF. Thus, Ghana's debt outlook which used to be stable was lowered by Fitch Ratings, the explanation was government's policy credibility at risk from targeted budget deficits for the past two years. Fitch expects rising interest costs and weaker revenue growth on the back of rising macroeconomic uncertainty to push the budget deficit over 10% of GDP - the third consecutive year of double digit budget deficits and above the government's target of 8.5%. This with the steep cedi depreciation will see debt jump to 61% of GDP by the end of 2014, from 58.2% in 2013. (Fitch Ratings 2014.)

2.4 Social factors

At a current annual growth rate of 2.19%, the population of Ghana was 24,658,823 in 2010. Majority of the population is in the southern part. About 51.9 % of the population resides in urban areas. Ghana's has a youthful population structure , 40 percent under 15 years of age. A diverse ethnicity exists in Ghana with the majority been Akan (47.3%). Mole Dagbani, Ewe, Ga-Dangme, Gurma and Guan follow suit at (16.6%), (13.9%), (7.4%), (5.7%) and (3.7%) respectively (USDS 2013).

Hofstede provides a tool to analyze the culture of Ghana. Figure 4 illustrates Ghana's scores in all the six Hofstede cultural dimensions. The analysis focuses on the first four areas, i.e. Power distance, Individualism, Masculinity and Uncertainty avoidance.

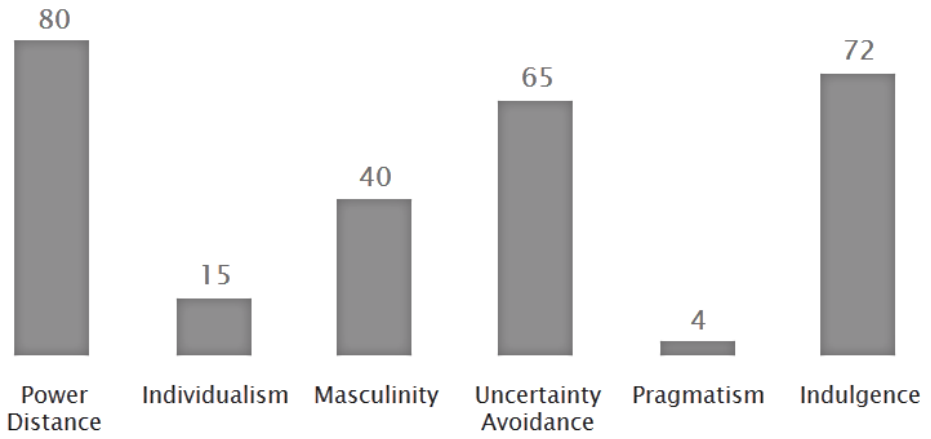

Figure 4: Ghana's scores on Hofstede cultural analysis tool (Source: Hofstede 2014)

Deductions from Hofstede results

As with most African countries, the high-power distance show Ghanaians place emphasis on people in higher authority. Age, experience and wealth are among factors that determine how much respect and recognition one demands. In most business environments, benefits are sometimes determined by these factors. Despite the increasing literacy rate and the tendency of Ghanaians to copy certain lifestyles from Western culture, the adherence to masculinity is still quite prevalent. Men are accorded much recognition even at the family level, and this has permeated the business culture. Although advisable for international companies to send males representatives to conduct business meetings, there are instances when women equally achieve successes.

The low individualism shows the social demeanour of Ghanaians. It is normal to know more about work colleagues. Sometimes, it is mandatory to invite work colleagues to events like weddings and funerals. In business meetings, Ghanaians will place much emphasis on the relationship established. This tends to make meetings last longer than expected as it comes up to first get to know each other. On the Masculinity scale, Ghana scores 40 and thus making it a relatively feminine society. A low score (feminine) on the dimension means that the dominant values in society are caring for others and quality of life. A feminine society is one where quality of life is the sign of success and standing out from the crowd is not admirable. Although agreeing with most of the description for such cultures, the author expresses reservations on issues like value for equality and status. Although these may exist, the increasing greed in Ghana has eroded some of these factors. Foreign companies must be on the lookout for these factors employing staff and dealing with business partners.

Ghana's high uncertainty avoidance score indicates the high resistance to change or innovation. For companies currently operating in the wood pole industry, it may indicate a desperate situation or anxiety due to the high declining rate of raw materials to feed the treatment plants. Countries with high uncertainty avoidance are supposed to be punctual, the opposite is, and however, what exits in Ghana. Punctuality among Ghanaians is very low and cuts across all segments of society even among government officials.

Corruption

Corruption is a phenomena which has invaded most SSA country economies and continues to affect the successful operation of investors. The situation becomes even alarming when one has to deal with government officials. Transparency International corruption index rates Ghana among the ten least corrupt countries on the continent (Transparency International 2014) . On the whole, the corruption level in Ghana is better when compared to other SSA countries. A few international companies though have explained corruption to be an impediment for successful investment in SSA of which Ghana is no exception (USDS 2013).

Labour

There exists an appreciable qualified human resource in Ghana, although the labour market has a high rate of informal employment relationships. The situation is also compounded by the lack of accurate employment data. The wage rate level is low. Over the past two decades, the minimum has been under US$ 2. Even at that rate, majority of those employed by the informal sector still earn below the national minimum wage. (TUC 2009, 31.) There has been an improvement at least for those employed by the government with the Single Spine Pay Policy (SSPP) in 2009. The policy ensures that public employees are given similar wages based on similar skill levels with a base pay reflecting the minimum wage. However, for those in the informal and private sector, the National Tripartite Committee set the minimum wage. The committee, made up of the Minister of Employment, five other government representatives, employer's union and trade union, also gives advice on employment and labour matters, including labour laws, labour standards, industrial relations and occupational safety and health. (Ulandssekretariatet 2012, 1.)

Trade union

Ghana has an amalgamated trade union movement; a high percentage of the labour force are members of trade unions. The labour act of 2003 introduced trade union pluralism. Until then, all trade unions had to be affiliated to Ghana Trades Union Congress (TUC). Most trade unionists are still members of TUC. (Ulandssekretariatet 2012, 1.) The main umbrella organisation TUC, is made up of various unions that cut across workers in all sectors of the economy. Workers of the forest and timber industry falls under the Timber and Woodworkers' Union (TWU). Due to dwindling supply of resources from forest, majority of workers in the sector are losing out on jobs as companies struggle to acquire the needed raw material for production. (RLF 2012, 12.)

2.5 Technological environment

Ghana is unquestionably technologically advanced in SSA. The mobile telephone network infrastructure is comparable to that of the developed world. As a result, networking company Alcatel Lucent has hinted on plans to work with mobile telephone operators to launch a long term evolution for high-speed data. There exists a high-capacity fibre-optic cable system that transmits data and Internet traffic at appreciable speeds between West

Africa and the rest of the world. The 9, 800km long cable network offers 99.9 percent uptime as well as long-distance voice, video and data communication services. Ghana was one of the very first countries in Africa to get connected to the Internet and to introduce Internet broadband services. In spite availability of such a high-speed data connection, the population Internet penetration is only 10% (Budde 2014). The access to the modern communication technology means the locally planned company can easily interact with the head office.

2.6 Environmental setting

The country is rich in both natural and mineral resources. The abundance of gold is why the country was known as the Gold Coast. Recent discovery of oil made the country an oil-exporting country. There are vast arable lands, which promote agriculture and thus make it one of the key sectors of the Ghanaian economy. Most of these resources are depleting at alarming rates due to over exploitation and lack of environmental awareness. In less than 50 years, rainforest has been reduced by 90 percent in addition to a loss of 26% of forest cover between 1990-2005.

Ghana's commitment to protecting the environment takes its source from the national constitution; Article 36(9) of the constitution of the Republic of Ghana discusses the principle of state policy, which is concerned with the environment. ''The state shall take appropriate measures needed to protect and safeguard the national environment for posterity; and shall seek co-operation with other states and bodies with the main purpose of protecting the wider international environment for mankind''. Prior the constitution, an Environmental Action Plan (EAP) was adopted by the government of Ghana in 1988 while the national policy in 1991.

Ghana has a tropical climate due to strong west wind with the highest seasonal variations happening in the northern part of Ghana. There are two seasons notably in Ghana, namely, the rainy and the dry season. Rainy seasons occur from April to July and again from September to November. The dry seasons, on the other hand, begin from December to March. The south-western part of Ghana usually records an average maximum

temperature of 2000mm/annum during the rainy season whilst the minimum rainfall amounts to 900mm/annum at the south-eastern part of Ghana (Bedzo 2013.)

The country's terrain is largely low plains in the south-central area. Almost half of the country's land area lies under 152 meters above sea level. The highest peak is 883 meters above sea level. Ghana's coastline is mostly a low-lying sandy shore with large areas of plain land, scrubs and intertwined by several rivers and streams. The country's tropical rain forest belt extends northward from areas near the Côte d'Ivoire frontier. This area produces a large chunk of the country's cocoa, minerals, and timber. Beyond this area to the North, the topography varies from 91 to 396 meters above sea level that is covered by low savannah and grassy plains. (Princeton 1993.)

2.7 Legal framework for foreign businesses in Ghana

The Government of Ghana has created favourable business conditions for foreign-owned business. For example, no restrictions are placed on foreign companies that wish to transfer of dividends or of net profits to their head office or home country. Instances where foreign investments are seen to be critical to Ghana's economic development, reliefs and additional incentives are granted . (USDS 2013.)

2.7.1 Registration

To operate a business, whether local or foreign owned, one precondition is to register with the government. The governmental agency in charge is the Registrar General. Legislations that regulate businesses include "The Companies Code, 1963 (Act 179)", "The Partnership Act, 1962 (Act 152)" and "The Business Name Act, 1962 (Act 151)". A business entity can register either a company or partnership.

The main difference between a partly owned and fully owned foreign company is the minimum equity capital required as per the Ghana Investment Promotion Centre (GIPC) Act, 2013 (Act 865). Whereas the minimum equity is US$200,000 for partly owned, fully owned is US$500,000. The equity capital can either in cash or goods, plant and machinery, vehicles or other tangible assets. The above forms are called Resident companies. No

equity capital is required for entities registered as External companies (non-resident companies). They include entities established outside Ghana but has a place of business in Ghana. The place of business can be a branch, management, share, transfer, registration office, factory, mine or other fixed places of business. It, however, does not include an agency unless the agent is authorized to negotiate and conclude contracts on behalf of the outside company. Unlike resident companies, non-resident companies do not have to go through the process of incorporating the business. They only submit certain required documents under Act 179 to the Registrar (GIPC 2013).

Although registration is not cumbersome, bribery and corruption as well as institutional weakness makes the whole process lengthy, complex, and requires compliance with a several other institutions apart from the registrar general. This is not favourable for individiual companies who could have handled the registration themselves. Individual companies thus have to rely on agents or consultants for the registration process. According to the World Bank's Doing Business 2013 report issued in 2012, the average time to start a business in Ghana is 12 days, down from 33 days in 2010 and 129 days in 2003. (USDS 2013.)

2.7.2 Statutory requirements, certifications and permits

Apart from incorporating entities with the Registrar General , new businesses are also required to register with other regulatory bodies depending on respective area of business. The general ones are mentioned below.

Ghana Investment Promotion Centre (GIPC)

Under the GIPC Act, all companies in which there is foreign participation are required to register with the GIPC, except companies in the mining and petroleum industry. The purpose of the GIPC is to act as a one-stop shop for economic, commercial and investment information for international companies and businesses interested in investing in Ghana.

Ghana Free Zones Board (GFZB)

Companies in industries other than mining, petroleum and timber can obtain a license from GFZB to operate as a free zone entity. To qualify for this, the entity needs to export at least 70% of its goods or services. GFZB registration enables the company to enjoy a

tax holiday for a 10-year period; thereafter, it will be required to pay corporate tax at a maximum rate of 8%.

Social Security and National Insurance Trust (SSNIT)

This is the national pension organisation and which ensures that pension regulations are adhered to by companies. As per the current regulation, every employer is required register with the Trust and subsequently make employee contributions. Employees contribute 5.5% of their basic salary whiles the employer 13% every month. (Deloitte 2013.)

Ghana Revenue Authority

The revenue authority deals with revenue mobilization and tax issues. Registration will enable both the company and authority state the appropriate tax rates to be applied as well as the incentives or tax holidays that need to be granted.

Environmental Protection Agency (EPA)

To ensure that activities of companies do not cause harm to the environment, companies are required to obtain environmental certificate which is issues after an environmental impact assessment report of the companies activities is approved.

2.7.3 Taxation and incentives

Taxes consist of the income taxes, sales and service taxes administered by the Domestic Tax Revenue Division (DTRD) of the Ghana Revenue Authority (GRA) and customs and excise duties administered by the Customs Division (CD) of the GRA. Company tax applies to both resident and non-resident at a rate of 25% except in instances where incentives apply. Other tax obligations vary according the area of specialisation. Examples are capital gains tax, branch profit tax and stamp duty among others. A detailed description and explanation of these required taxes are made to new businesses during registration with the Ghana Revenue Authoirty to help know which taxes apply to respective businesses. (PKF International 2012, 5.)

Businesses in Ghana benefits from incentives as a drive to encourage the development of the private sector The Internal Revenue Service law makes provision for these incentives which spans reduced rate of taxes, exemption from the payment of duties and other taxes

for specified periods, higher rate of capital allowance, among others. For example, corporate tax rates vary depending on location of the manufacturing or production plant. Locations in the free zones area is 0% whiles locations other than Accra and Tema can pay 12.5%. (PKF Interntaional 2012,5.) According to Boakye (2014), companies that deal directly with the government have the opportunity to seek tax reliefs so as to make prices competitive. A waiver of 45% import duty and VAT on all timber imports has the rationale to help support the already depleting local wood resources. (TIRG 2008, 24.)

3 GHANA TIMBER INDUSTRY AND PROSPECTS

Overview

Basically, the production in the timber industry is a three-step process. Timber is first harvested from the forest (referred to as timber concessions), then further processed into sawn wood or veneer from which other products are developed. The industry employs over 70 000 people who are directly involved in the industry. Those indirectly involved numbers over 2 million. In 2004, about 100 sawmills operational. These included 17 sliced and rotary veneer mill; 40 specialized in moulding and machined wood. Six firms were into in flooring products and doors while 10 were engaged in plywood processing. Due to the challenges facing the industry, these numbers is likely to have reduced. (ICG 2012, 99.)

Current status of the Ghana timber industry

Ghana's timber industry is in a declining state. The rate is so alarming that urgent measures are being put in place by both the government, and forestry professionals to address the challenge. A supposedly Master Forest Development Plan 1995 to protect the forest and help curb illegal activities did not yield any positive results. Rather, illegal chainsaw logging and trade in illegal timber has reached unprecedented levels. Available estimates indicate that as much as 1.5 million cubic meters representing 50% of the annual harvested timber that come from illegal sources are supplied to the domestic market. This arises because of the profitability of selling to the foreign market instead of the domestic ones. Most of the mills and firms operating in the industry are also poorly equipped to process downstream wood product, which is most preferred by the domestic. This leaves domestic supply in the hands of illegal chain saw operators.

Additionally, state institutions whose duty ensures sustainable management of the forest are inadequately equipped. Lack of resources, poor capacity and limited infrastructure prevents these forestry staffs from implementing forest management directives. They are unable to curb illegal felling operations and enforce policies that will enhance sustainable management of the resources. (TIRG 2008, 8-9.) Over the years, lack of research into the utilization of lesser-known species has prevented the harvesting of some trees whiles

the much known ones over exploited. Unfortunately also, plans to embark on forest plantation have failed as estimated target could not be achieved. There was a target to reforest a total of 400,000 hectares of degraded forest reserves through annual plantation rates of 15,000 hectares. Up to date only 2,500 hectares per annum have been planted. (ICG 2012, 99.)

The current state of affairs has affected companies operating in the sector. Whereas most sawmills and tertiary industries are at the verge of collapse, the construction industry is inundated with wood substitutes. Industry experts believe that the remedy among a host of others is the importation of log and wood raw materials. (Tufuor 2012, 21.)

3.1 Prospects of wood pole business in Africa and Ghana

The supply of electricity from the main source of generation to final users is done through transmission and distribution, mostly via overhead power lines. Whereas transmission occurs in the transport of high voltage, distribution occurs in lower voltages. The use of this mode of electricity transportation has been in existence for several years. Despite the technological advancements witnessed in most aspects of infrastructural developments, this mode is still being pursued. Industry experts believe the use of overhead power lines will continue into the foreseable future. Even if new technologies come up, they will not dominate overnight. Considering the rise in newer and renewable sources of energy generation (solar, wind, geothermal, etc.) , it is believed that more poles will be needed in the future to transport energy to users. (Transmission & Distribution, 2010.)

The listed arguments give a reason to believe that poles will continually be used in the foreseeable future. Next the focus will now be moved to the rising investment opportunities in electricity transmission and distribution market. First consideration will be in factors influencing the demand for wood poles on the African continent, and secondly narrowed down to Ghana.

3.1.1 The demand for wood poles in Africa

Africa has a population of about one billion people. This population is expected to more than double in 2050 to reach 2.4 billion people. The projections were grounded on the fact that birth rates in SSA will decrease over the coming years; however, current available data indicates birth rates have rather increased. (The Economist, 2014).

The rising population coupled with high urbanization gives rise to the demand for energy. According to the Ecobank (2014, 1), growing demand for energy and need for energy infrastructure development has made Africa a top-priority destination for energy investments. In this regard, IEA (2011) forecasts that SSA will require more than $300 billion to achieve universal electricity access by 2030 (figure 2). Considering, for example, only West Africa where Ghana is located, the projected electricity transmission and distribution upgrade for 2014 is US$500 million (Ecobank 2014, 1). These projections give strong indications that more electricity transmission utilities, including wood poles are needed.

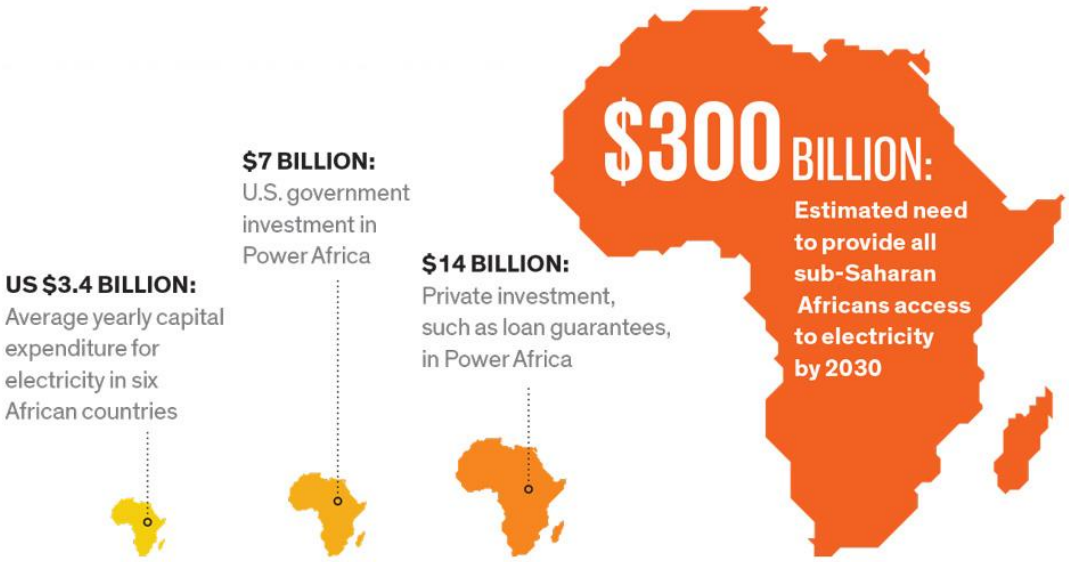

Figure 2: Projected power sector investments in African (Source: African Globe 2014)

Furthermore, the need for wood poles in Africa can be attributed to wood supply gap. The GEF (2013) explains that the general perception of Africa having enough natural forest resources is not entirely factual. The ability of African forests to supply the needed wood resources is gradually being defeated. Unfavourable location of forests (which has supplied over 90% of Africa's wood resources), conflicts and lack of infrastructure have prevented access to and harvesting of these resources. Africa's high rate of deforestation and

degradation continue to deplete its forests at very disturbing levels. In the midst of all these, an alternative source (wood plantations) that could boost the supply of wood resources seems to be non-existent. Very little has been done by both African governments and private companies in the area of plantation's development. This leaves most countries with no option than to import the wood it requires, especially wood pole's species, which must have certain specific characteristics.

A final reason that will drive the demand for wood poles emanates from transmission and distribution losses. The World Bank defines electric power transmission and distribution losses include losses in transmission between sources of supply and points of distribution and in the distribution to consumers, including pilferage. These losses which are a quite normal phenomenon in the industry occur through either technical or non-technical reasons. For most SSA countries, however, the losses are far beyond averages. International average ranges between 10% and 12%, as high as 30% have been recorded in some SSA countries (USITC 2009, 5-5). Although non-technical factors account for a chunk of these losses, technical issues like old and inefficient distribution networks bring about losses. The issue of inadequacy of distribution networks which places distribution out of balance with respect to supply and demand. This results in electricity deficiencies. Improving the distribution networks, repairing and renovating these old electrical networks will all require the use of poles? A reason for the distribution losses which is not related to wood poles but might be of interest to IMOY is the lack of skilled engineering personnel with a good understanding of the implementation of efficient electricity networks. For example, professionals in ESKOM (South Africa’s electricity public utility) indicates that shortfalls in operating and maintaining of distribution networks is because of the scarcity of qualified staff. (SAICE 2006, 14-15.)

3.1.2 Demand on wood poles in Ghana

To begin with, it must be unequivocally stated that there is a serious decline in the Ghana timber industry due to the high depleting rate of forest resources. The GNA (2014) quoted Barbara Serwaa Asamoah (Deputy Minister for Lands and Natural Resources), that arrangements were being made with other countries to import wood. According to Boakye (2014) and Adjei (2014), the lack of raw materials for wood treatment continues to remain the biggest challenge faced by wood treatment companies currently operating

in Ghana. Other public authorities expressed similar sentiments, (Yaba 2014) and (Govenor 2014). The depleting forest resources explain why Ghana ranks high among SSA countries that import wood poles.

Ghana boasts of a high rate of electrification in SSA, current data estimates about 72% coverage, which gives a suggestion of an extensive distribution network. Just like other SSA countries, the increasing rate of urbanization and robust economic growth means more electricity is needed to propel economic development. Most of the distribution network is, however, old (almost 40 years) and weak resulting in losses of 20% of power generated. As a result, the government has put in place measures to revamp the electrification sector and to increase access rate. A new hydroelectric generation plant was recently completed, and other power generation efforts have been pursued by the government to add up about 660MW to the electricity grid by the second half of 2014. (Reegle 2014.) The government has also established an infrastructure fund which will be dedicated to infrastructural projects (GoG 2013).

According to the World Bank (2013, 2), Ghana may need to invest as much as US$4 billion in the power generation, transmission and distribution over the next 10 years to make up for the past investment deficit and to upgrade its power sector infrastructure. It is in pursuit of this that in February 2014 Ghana received from the African Development Bank (AfDB) Group a grant of US $30.47 million for electricity projects. A loan of US $43.9 million was also given for the reinforcement and extension of the country's electricity distribution network (AfDB 2014). In August 2014, Ghana received Africa's largest power transaction from the United States. The compact will provide up to $498m to help transform Ghana's power sector. (CGD 2014.)

3.2 Regulatory bodies in Ghana's timber sector

Companies operating in certain specific industries, such as forestry in the case of wood pole production need to obtain licenses from their relevant regulative bodies. Table 2 below list the various processes and respective regulative agencies (Adam & Nsemkyire 2014).

Table 2: Regulatory institutions in the Ghana timber industry

Main Operation	Regulatory Institutions
Access to Raw Material	• Ministry of Lands and Natural Resources • Forest Services Division (FSD) • Timber Rights Evaluation Unit
Logging and Harvesting	• FSD • Resource Management Support Centre • Timber Industry Development Division (TIDD)
Milling / Processing	• TIDD • Ghana Standards Authourity
Products Transportation	• TIDD • Department for Roads and Highways
Trade and Marketing	• TIDD • Customs and Excise • Ports and Habours

3.3 Ghana wood poles trade

As per the Ghanaian standards, acceptable wood species for use as poles includes both local and foreign species. The local species include Afina

- (*Strombosia glaucescens*),
- Kusia (*Nauclea diderrichii*), and
- Kusibiri (*Diospyros sanza-ninika*),

Whiles the foreign species are

- Teak (*Tectona grandis*),
- Pine (*Pinus spp*) and
- Eucalyptus (*Eucalyptus spp*) wood species.

Currently, raw materials used includes (*Pinus radiata*) imported from Chile and Argentina, and (*Eucalyptus spp*) imported from South Africa.

Due to the current lack of supply from both natural forests and plantations, the wood pole industry is left with no option than to import. Over the years, poles harvested from the forestry department's plantations served as the main raw material source. The rising electrification rates in Ghana coupled with the loss of forest resources has compounded the

already worse situation. An estimated 100,000 wood poles are required for national electrification projects for the next thirty years, and local supplies are simply just not enough to meet the demand. (Odoom 1998, 35.) The most preferred pole size for high-voltage transmission is 9 to 15 meters, whilst 8 meters are mostly used for distribution to rural areas. The local supply can meet the demands for the 8 meter poles but resort to imports for poles above 9 meters. All treatment plants in Ghana currently embark on high levels of imports to feed their plants (Boakye 2014). Figure 5 illustrates the rising trend of treated wood poles imported into Ghana.

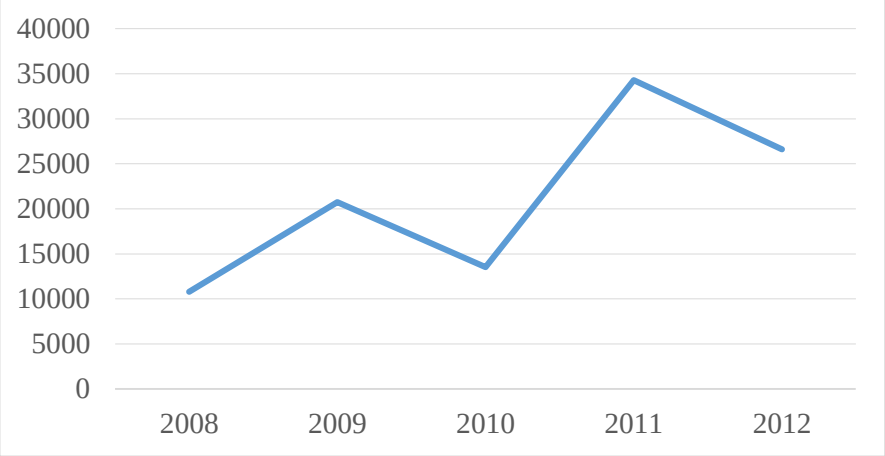

Figure 5 : Treated pole imports(in m^3) to Ghana 2008-2012 (Source: UN data 2014)

Wood pole treatment companies in Ghana

There are currently three wood treatment plants in Ghana – Dupaul, Busi & Stephenson, Byes & Ways. A fourth one, Eparko wood treatment plant is yet to secure the needed permits to start full production. (Adjei 2014). It was difficult to get access to more information about these companies as none had a website. Efforts to get their representatives to give information was not successful.

Specific Standards related to wood treatment

As per the Ghana Standards Authority, which is the national standards body, the following is the specific standards related to wood treatment and preservation. Extracts of the standards can be found in the appendices 1-4.

- GS 146-2: 2007 Codes of Practice for Wood Treatment Plants: Quality Control and Inspection of Timber Products. This standard describes the responsibilities

and procedures pertaining to the quality control and inspection of timber products by treatment companies.

- GS 146-1: 2007 Codes of Practice for Wood Treatment Plants: Quality Control Procedures for Wood Treatment Plants. This standard describes the acceptable minimum requirements for exercising total quality control in wood preserving plants, and adherence is necessary in order to assure quality and reliability of treated timber products.

- GS 145-1: 2007 Timber and Sawn Logs (Part 1) - Specification for Wood Poles for Overhead Power and Telecommunication Lines - Teak, Afina, Kusia and Kusibiri Poles. It specifies the requirements for wood poles, anchor logs and stabilizer logs for overhead power and telecommunication lines.

- GS 145-2: 2008 Timber and Sawn Logs (Part 2) - Specification for Wood Poles for Overhead Power and Telecommunication Lines: Pine poles. This standard specifies requirements for pine poles anchor logs and stability logs for overhead power and telecommunication lines.

- GS 145-3: 2008 Timber and Sawn Logs (Part 3) - Specification for Wood Poles for Overhead Power and Telecommunication Lines: Eucalyptus Poles. This standard specifies requirements for pine poles anchor logs and stability logs for overhead power and telecommunication lines.

3.4 Competition in Ghana's wood pole sector

Despite the existence of a high number of firms in the timber industry, the intensity of competition is very minimized. This is primarily because of the raw material supply gap on the domestic market. Almost all the firms target export markets where the competition for market share is negligible (Yaba 2014). The competition is even non-existence when considering the treated wood pole sector. As a result, market competition which would have been an entry barrier for a foreign company like IMOY is eliminated. In explaining the poor raw material supply, Adjei (2014) and Boakye (2014) mentioned high raw

material imports had had some effects on competition in the trade. The present demand for wood poles far exceeds the supply, and that eliminates fierce competition among the treatment plants.

4 BUSINESS PLAN

This chapter centres on practical aspects about establishing a treatment plant in Ghana. The analysis is based on information provided in the preceding chapters. It is assumed that the proposed treatment plant will have an estimated production capacity of 10,000m³ which amounts to a total of 30,000 wood poles annually. This capacity represents the planned investment of IMOY.

4.1 Registering a company in Ghana

Since IMOY is already incorporated in Finland, registering as an "external company" in Ghana would be appropriate. In that situation, the company would only need to submit its documents to the registrar general in Ghana. It can then proceed to register with the other statutory institutions. This can be done by a locally appointed manager of the company. Alternatively, a consultant can be hired to execute this job. Probably, the most critical of all these registration processes will be at the Ghana Revenue Authority. The tax percentage agreed would affect the profitability margin, thus it would be prudent to use someone well versed in the tax issues for a wood treatment plant. In that way, the company can save some money or maximize profitability.

4.2 Wood pole market

The demand for utility poles will continue to rise not only for Ghana but the whole of SSA. The preference for wood poles will depend on choices made by governments and grid owners. Over the period, most of these electrification projects have been executed either through government funds or international loans. Since most of these African countries and international agencies ascribe to UN conventions on the environment, it is expected that preference will be given to wood poles.

Ghana may not be offering the highest market demand, although there is a high rate of electricity in the country (about 70%). However, the country's extensive overhead electricity network and concerted effort by government to improve electricity gives a fairly sustainable demand. The country's location and description as the gateway to West Africa offer access to markets and demand from other West African countries, which has an average electrification rate of 31%.

Potential customers

The primary target market for the treated wood poles would be the Ghana electricity market, all of which falls under the Ministry of Energy. In embarking on the numerous electrification projects, the ministry relies on transmission and distribution businesses to execute these projects. One of such businesses already operating in Ghana is the Finnish company ELTEL. These companies that execute the transmission and distribution then contracts treated wood pole suppliers for poles. Other state institutions under the ministry of energy that also engages in electrification projects are the Electricity Company of Ghana and the Volta River Authority. Furthermore, request for wood pole sales will come from the various international agencies in Ghana like the World Bank that directly buys wood poles to execute electrification projects in Ghana. Secondary markets will look beyond the borders of Ghana and consider the West Africa sub-region that also requires high investments in its power sector.

The primary markets' sales are normally available as bids either on the website of the respective agencies or the national procurements' authority. Unlike the bids placed on the website of international agencies, successful winning of local bids goes beyond just waiting for bids to appear online and deciding to apply. With the prevalence of corruption in Ghana, it means that the appointment of an experienced staff in the Ghana wood pole business would prove vital for sales generation of the company. This person with the right contacts can improve the chances of winning bids. Such a person is also likely to gain access to prior information about upcoming bids, tax changes, governmental incentives, among other information that might influence business operations.

Expected profit

Currently, with the projected annual wood pole demand in Ghana pegged at 100,000 poles (approximately 30,000m^3), IMOY could conservatively plan to supply about 30%, i.e.

30,000 poles (9000m³) annually. Supplying the Ghana market with 9000m³ of treated wood poles will reduce say 2012 pole imports by almost 34%. Total sales from this could amount to US$9 million at an average sales price of US$300 per treated pole. Considering the cost structure explained in table 1 and bearing in mind the reduced cost of production in Ghana, a moderate profit component of 20% can be expected. With this estimate, investment could make an annual profit of almost US$ 2 million.

Trade barriers and operating environment

Operating on the Ghana market does not present significant trade barriers to IMOY, which is already a big player on the European market. The lack of an overall economic or industrial strategy that discriminates against foreign-owned businesses means IMOY can establish a treatment plan and conduct business. Previous sales to Ghana by IMOY reveal the company understands some of the requirement and standards for the Ghana market. Generally, the Ghana standards ascribe to the International Organisation for Standardization (ISO) and since the company already possess these certifications, securing the required local certification will only turn out to be a formality. Due to nature of wood pole sales, in that the buyers are mostly governments or governmental agencies, companies engaging in the sale of such products do enjoy some protection by government officials. Even in cases where the management of electricity is in private hands, the sensitivity of electricity to national developments still ensures some sort of protection.

Risks

For a foreign company planning such high investment, the need for trusted workers and reliable trading partners is very critical to the success of the planned plant. Although Ghana's political environment is stable, the volatile nature of some African economies does pose some amount of risks. Expropriation which has always been the bane of most international companies is something that comes up when thinking about risks in operating in Ghana.

4.3 Production and business operations

Source of raw material

Taking cognisance of the importance of raw material supply to any production company, this is one big challenge that treatment plants planning to operate in Ghana need to overcome. Available data and interviews conducted indicates an urgent need to secure a constant supply of wood poles. The local supply is simply just inadequate. Although there exist some plantations, the quantities cannot guarantee a long-term supply. Harvests from local plantation are mostly smaller in diameter and hardly goes above 9 meters. The fact that all the treatment plant in Ghana import raw materials to augment production gives strong signals that IMOY would have to investigate whether to import from Argentina, Chile, South Africa or elsewhere.

Preferred product

Specifically, production should focus on poles treated with waterborne chromated copper arsenate, type C (CCA Type C, oxide formulation). A detailed description of the exact specifications is explained in appendix 2. The preferred length, top and down diameter will vary according to customer demands and requirement. Acceptable dimensions are also explained in appendix 2. Unlike very hilly countries with adverse weather conditions which prefer poles with bigger diameters, the mostly plain terrain of Ghana's land area means virtually all lengths and sizes of poles can be used for either transmission or distribution of electricity in Ghana.

Required equipment and machinery

The equipment and machinery required will depend on percentages of mechanical or manual activities are to be employed in the production process. Essentially all the process of wood treatment utilizes machines, and a typical treatment plant is characterized by several machines. The sophistication of each type of machinery which are mostly custom made can vary. Although there are machines used in at the fabrication stage, this is manually done at IMOY. The use of open air drying although cheaper takes a longer time. It will therefore be judicious to have artificial drying in place, which could supplement open air drying. The positive thing is that waste from debarking can be used to fuel the drying plant. Alternatively, in the tropics (Ghana) where the sun is in abundance, a solar powered drying facility could be established.

Plant location

A critical factor which could have a bearing on the choice of location is the source of raw material. However, as it remains now, that factor is eliminated since the raw material is almost non-existent in Ghana. Since importation is going to be the source of raw material then any location quite close to the Takoradi Port in the western region of Ghana could be a suitable. The reason for this choice lies in the fact that unlike the Tema Port, it gives easy access to the central and northern parts of the country where electrification rates are low and new networks are expected to be constructed. It also offers easy access to the more urbanised areas like Kumasi and Accra where the concentration of electrical networks is high. Congestion and subsequent delays at the Tema Port could be avoided by use of the Takoradi Port. The nearness of Takoradi to neighbouring Cote d'Ivoire can also assist in exploring market opportunities in that country where electricity access rate is quite appreciable. As part of governmental incentives (Page 35), the company can save as much as 50% less of corporate tax if the plant is located just outside Takoradi, which is the regional capital. The existence of power generation facilities in Takoradi, coupled with development of natural-gas supply due to oil discovery, to some extent, provides assurance of good supply of electric power.

Production

As pertains to wood pole demand on the Ghana market, there are two main factors that production must consider. Firstly, the impact of weather on drying time and secondly, the high wood pole demand during election years. High humidity in the tropics (Ghana) means longer time will be required for open are drying of poles. The best profitability situation will be to acquire raw materials locally. However, if importing becomes an option, already dried poles should be preferred to avoid waste of resources. Importing undried poles is equal to paying for the transportation of the water in the wood.

Staff and management

An estimated 30 - 40 people will be required for full production capacity in Ghana. This estimates is based on the assumption that it would be prudent to give employment to more people than maintaining a much reduced number that will only benefit from high wages. Five of these staffs will be responsible of various management and administrative duties whiles the remaining will be engaged in the various stages of wood treatment. (Monni, 2014.)

Competitive advantage

Starting and operating in a new market brings its own competition; however, the declining in the industry may inure to the benefit of IMOY. In situations when imports from other countries become difficult, IMOY can rely on its head office in Finland. The lack of a fierce competition in the wood pole market paves the way for IMOY to set up in Ghana. What needs to be done is to understand the intricacies in the business culture of the wood pole trade in Ghana and around SSA. To some extent, this can be solved through the employment of experienced personnel. IMOY's long years of experience, wider access to international markets, and higher financial resources as compared to local ones can be very significant during bidding for contracts. These factors undoubtedly establish the company as competent and credible.

Logistics and distribution

The limited transportation options available in Ghana mean wood treatment plants can only utilize road transport to receive stocks and to deliver finished products to consumers. Ships will be used in the situation where poles are imported into the country. When plans of the government to improve the railway system comes into fruition, the company can then utilize the railways.

A factor that has contributed to the success of IMOY, is the extent of customer penetration (decoupling point) in the production process. Right from the harvesting of poles to the final stage of the processing, customer preferences are taken into consideration. Despite the uncertainty as to where raw materials for the plant are going to come from, this practice is something that will surely enhance the chances of success in Ghana.

4.4 Financial projections

Table 3 illustrates the projected income in the first year of operation. Two scenarios based on different source documents were examined. The first was based on the current cost structure mentioned in table 1 and similar to what pertains at IMOY. The second scenario is based on an actual company assessment in the 1988 (see appendix 5). The assessment of Dupaul Wood Treatment in Ghana was executed by the international Science and Technology Institute, Washington DC.

Table 3 Projected Income Statement for first year of operation in Ghana

PROJECTED INCOME	BASED ON CURRENT COST STRUCTURE	BASED ON 1988 COMPANY ACCOUNTS
Sales		
80% Primary Market (24,000 Poles)	$7,200,000.00	$7,200,000.00
20% Secondary Market (6,000 Poles)	$1,800,000.00	$1,800,000.00
Revenue	**$9,000,000.00**	**$9,000,000.00**
Costs of Goods Sold		
Poles	$2,250,000.00	$674,511.22
Treatment Chemical	$2,340,000.00	$2,228,167.99
Sub-Total	**$4,590,000.00**	**$2,902,679.22**
Gross Profit	$4,410,000.00	$6,097,320.78
Gross Profit Margin	**49%**	**68%**
Operating Cost		
Transport	$1,122,335.66	$1,894,822.59
Labour	$221,958.04	$374,728.46
Utilities and Maintenance	$57,902.10	$97,755.25
Overheads	$667,804.20	$1,127,443.88
Sub-Total	$2,070,000.00	$3,494,750.18
Total Costs	**$6,660,000.00**	**$6,397,429.40**
Operating Profit	$2,340,000.00	$2,602,570.60
Operating Profit Margin	**26%**	**29%**
Depreciation	$0.00	$0.00
Interest	$0.00	$0.00
Taxes (15%)	$351,000.00	$390,385.59
Total	**$351,000.00**	**$390,385.59**
Net Profit	**$1,989,000.00**	**$2,212,185.01**
Net Profit Margin	**22%**	**25%**

Assumptions:

- Sale of 30,000 poles each sold at US$300,00
- The company has no loans to pay
- Depreciation on equipments and machinery not included

In both cases, the net profit margin of over 20% is a clear indication of the profitability of operating a wood treatment plant. This margin has a conservative tax component of

15%, which, in reality, could be reduced or eliminitated altogether. In the case of Dupaul Wood Treatment plant, the company enjoyed a tax holiday of 0% for a period of five years. The operating profit margin can also be improved as the activities that contribute to this profit is under the control of management. Measures need to be put in place to monitor the right combinations of operating costs that will yield optimum returns.

The lack of alternative cheaper modes of transports is evident by the high amount that goes into it. Yet again, the company stands to make more profits if the planned railways become functional. The same can be said for the high cost of raw material and chemicals, which has final implications on profits. The analysis assumed that all the raw materials would be imported before treatment. In a given case that any percentage of the raw materials is secured domestically or even at much cheaper cost, profits could be further improved.

Exchange rate analysis

Although Ghana has its own currency called Ghana Cedi (GHS), the wood pole trade is mostly quoted in US$. This is partly due to the weak performance of the GHS against major trading ones. In instances when regulation requires the use of the GHS, the conversion is made from the US$. Since the official currency of IMOY is the Euro (€), an analysis is made between the two currencies and the possible impacts on the operations of the treatment plant. The performance of the Euro against the US Dollar over a period of almost seven years is shown on figure 6.

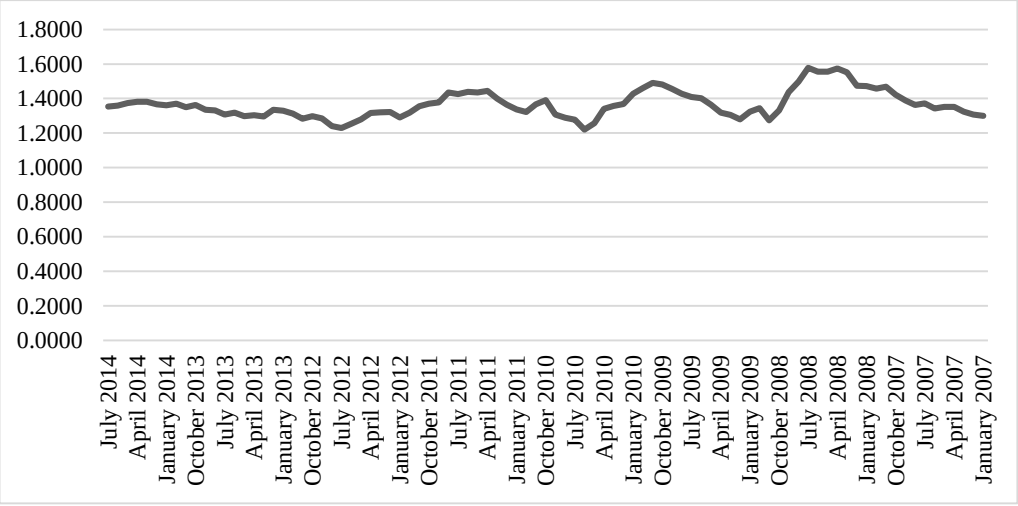

Figure 6 Performance of the Euro against the US Dollar during the past seven years (Source: European Central Bank 2014)

The slight appreciation and better performance of the Euro against the US dollars mean cash investments from Finland to Ghana will have higher value. Company profits will also be enhanced as all operating costs will require few euros in respect of the poor performance of the GHS against the Euro. The stronger Euro performance will benefit the company in situation where there are signed contracts for the supply of raw materials and chemical in US$. The downside, however, is that the net profit that is likely to be brought back to Finland will have a lesser value. For example, at current exchange rates, the net profit of US$ 2,212,185.01 will have an equivalent of € 1,701,680.77.

Estimation of investments recovery

Estimating the cost involved in establishing a treatment plant in Ghana would depend on several factors that of which we have no control over. These costs must consider the type and size of the yard for drying poles and what percentage of poles will undergo air drying. Environmental requirements by state authorities can also greatly influence the amount of investments, and the same can be said for source of electricity for the treatment plant. For example, an environmental impact assessment might recommend the need for a more sophisticated method of waste disposal. In totality, the estimated invest could range between US$3.6 million to US$6 million. So assuming an average net profit of US$ 2 million is made yearly, it would take approximately two to three years to recover the investment. (Monni 2014.)

5 CONCLUSIONS

This feasibility study which considered the establishment of a wood treatment plant in Ghana by IMOY concludes with very bright signals. First of all, the wood pole market in Ghana and sub-Saharan Africa is rife. The increasing need for wood poles will continue to be driven by high population growth, rising urbanisation and the resultant need for electricity. Secondly, Ghana as the target market for establishing the treatment plant offers a friendly and conducive business environment to foreign-owned companies. However, corruption has to be effectively managed if prices are to remain competitive. Finally, the current lack of raw material supply in the wood pole business coupled with the smaller size nature of local treatment plants favours IMOY which could always count on its bigger production facility in Höljäkkä. All these factors in addition to the company's vast experience and international exposure contributes to a high competitive strength with respect to local companies.

Recommendation

Establishing a wood treatment plant apart from been a long-term investment is also capital intensive. For an international company like IMOY, reliable trading partners and trust in dealing with people of a distant continent and culture means the company must find a way to get acquainted with the practicalities of the trade. The current price levels in Ghana do not make it attractive to supply poles from Finland. For this reason, it is recommended that IMOY initiate business activities to establish a permanent business in Africa. In analysing the larger picture indicators, the findings of this study support the notion that it is time to secure a market share of the profitable and growing power (electricity transmission and distribution) market in SSA.

In a bid to get acquainted and improve business experience on the African market, the following options could be explored before finally setting up the plant or acquiring one.

1. A business agreement could be reached with one of the treatment plants currently operating in Ghana. The agreement should enable IMOY access to business performance, procurement data, logistics, trading partners, and an understanding of how things work in Ghana. This information could serve at the basis to explore the opportunities of acquiring a local company.

2. Finally, since Ghana faces high amounts of transmission and distribution losses and lacks qualified engineers to set up and maintain electrical networks just like most SSA countries, IMOY can seek the prospects of first entering the Ghanaian market with the services of the newly acquired Exsane Oy, which specializes in the maintenance, inspection, clearance and design of power distribution networks.

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Specifications for Teak, Afina, Kusia and Kusibri Poles (extract)

GHANA STANDARDS AUTHORITY

GHANA STANDARD **GS 145-1:2007**
2nd Edition

TIMBER AND SAWN LOGS – SPECIFICATION FOR WOOD POLES FOR OVERHEAD POWER AND TELECOMMUNICATION LINES –

PART 1:
TEAK, AFINA, KUSIA AND KUSIBIRI POLES

ICS 29.240.20 **Ref. No. GS 145-1:2007**

GHANA STANDARD **GS 145-1: 2007**

Timber and Sawn Logs – Specification for wood poles for overhead power and telecommunication lines – Part 1: Teak, Afina, Kusia and Kusibiri poles

1. Scope

This Ghana Standard specifies the requirements for wood poles, anchor logs and stabilizer logs (hereinafter called poles, except where specifically referred to as anchor logs or stabilizer logs) for overhead power and telecommunication lines.

2. Normative references

The following standards contain provisions which through reference in this text, constitute provisions of this standard. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below.

2.1 AWPA P5-96 –Standard method for analysis of water-borne preservatives

2.2 AWPA A9-01– Standard method for analysis of treated wood and treating solution by X-ray spectroscopy.

2.3 AWPA A2-98– Standard method of analysis of CCA treating solutions and CCA-treated wood by colourimetry.

2.4 AWPA A-11-93 – Standard methods for analysis of treated wood and treating solutions by atomic absorption spectroscopy.

2.5 GS 146-1:2007 – Code of practice for wood treatment plants: Quality control procedures for wood treatment plants.

2.6 GS 146-2:2007 – Code of practice for wood treatment plants: Quality control and inspection of timber products.

3. Definitions

For the purposes of this standard the following definitions apply:

3.1
air seasoning
drying by use of air where the temperature is not more than 60 degrees Celsius either in the open or under cover

3.2
check
the lengthwise separation of the wood that usually extends across the growth rings and commonly results from stresses set up in the wood during seasoning

3.3
crossbreak
the separation of the wood cells across the grain. Such breaks may be due to internal strains resulting from unequal longitudinal shrinkage or to external forces

3.4
dead streak
an area devoid of bark, resulting from progressive destruction of the growth cells of wood and bark at the edges of the streak. On a pole, dead streak is characterized by a discoloured, weathered appearance and by lack of evidence of overgrowth along the edges of the deadened surface

7. Manufacturing Requirements

7.1 Sawing

Unless otherwise agreed between the manufacturer and the purchaser, all poles shall be neatly sawed at the top and at the butt along a plane which shall not be out of square with the axis of the pole by more than 50 mm for each 300 mm of diameter at the sawed surface

7.2 Trimming

Completely overgrown knots, rising more than 25 mm above the pole surface, branch stubs and partially overgrown knots shall be trimmed close. Teak and other species with thin sapwood shall be trimmed by hand. Trimming may be done by shaving machine on poles of species with thick sapwood. The lower 600 mm of poles may be trimmed to remove wood fibres causing butt flare, provided that sufficient sapwood remains to obtain minimum penetration requirement.

7.3 Shaving

If shaving is used on species with a thick sapwood, the depth of cut shall be not more than necessary to remove inner bark and trim smoothly and closely all branch stubs and overgrown knots. There shall be no abrupt change in the contour of the pole surface between the groundline and the above ground sections. The lower 600 mm of poles may be shaved to remove wood fibres causing butt flare, provided that sufficient sapwood remains to obtain minimum penetration requirements.

7.4 Framing

All poles shall be bored, scarfed and cut to length prior to treatment in accordance with customer's instructions.

In the event that cutting or boring becomes absolutely necessary after treatment, the cut surface shall be saturated with treating solution with a minimum concentration of 3 %. All unused holes made after treatment shall be filled with preservative and plugged with tight-fitting treated plugs.

NOTE – These operations should be carried out by personnel with protective clothing who have been properly trained in the handling of preservative solutions.

7.5 Seasoning and conditioning

7.5.1 Air-Seasoning

Wood poles may be fully air-seasoned or partially air-seasoned. The air-seasoning shall be in conformance with the specifications for preservative treatment without developing pre-treatment decay. All air-seasoned poles shall be further kiln sterilized by conditioning prior to treatment so that the pith centre shall have been heated to 60 degrees Celsius (heat transfer usually requires one hour for each 25 mm diameter).

7.5.2 Kiln drying

Poles which have not been conditioned as mention in 7.5.1 shall be kiln dried prior to treatment.

NOTE – Poles should be kiln dried as soon as possible after felling preferably while they are still in "green" condition with the moisture content above the fibre saturation point. There are two reasons for this:-

I. The sooner the poles are dried the less chance of pre-treatment decay.

II. The higher the moisture content of the pole the easier it is to dry because of a higher heat transfer co-efficient.

7.5.3 Moisture content

The final moisture content before treatment shall not exceed 25% when determined using the increment borer and the oven drying method to the sapwood heartwood interface. The moisture content shall be determined at a point 1,5 m to 2,0 m from the butt of the pole. For anchor logs and stabilizer logs the moisture content shall be determined at the mid-point.

At least 10% of the poles in the lot shall be tested for moisture content prior to

Specifications for Pine Poles (extract)

GHANA STANDARDS AUTHORITY

GHANA STANDARD **GS 145-2: 2008**

TIMBER AND SAWN LOGS – SPECIFICATION FOR WOOD POLES FOR OVERHEAD POWER AND TELECOMMUNICATION LINES –

PART TWO:
PINE POLES

ICS 79.040; 29.240.20 **Ref. No. GS 145-2: 2008**

Table 1 - Species of Timber/Code Letters/Fibre Stress/Penetration Zone/Assay Zone

1 Botanical Name	2 Standard Name	3 Code Letters	4 Sapwood/ Penetration Zone	5 Assay Zone
Pinus canariensis	Canariensis	PCAN	100% of sapwood	12,5 - 50 mm
Pinus pinaster	Pinaster	PPIN	100% of sapwood	12,5 - 50 mm
Pinus radiata	Radiata	PRAD	88 mm or 90% of sapwood	12,5 - 50 mm
Pinus sylvestris	Sylvestris	PSYL	44% of radius and 100% penetration of sapwood.	2,5 - 45 mm
Pinus caribaea	Carribean	PCAR	44% of radius and 100% penetration.	12,5 - 50 mm
Pinus resinosa	Red pine	PRES	63 mm or 85% penetration	2,5 - 40 mm
Pinus ponderosa	Ponderosa	PPON	88 mm or 90% of sapwood	12,5 - 50 mm
Pinus taeda *Pinus palustris* *Pinus elliottii* *Pinus echinata*	Taeda Palustris Elliottii Echinata	PTAE PPAL PELL PECH	88 mm or 90% of sapwood	12,5 - 50 mm

4.3 Strength

4.3.1 Poles

When tested, after all machining has been completed, in accordance with either annex C.1, annex C.2 or annex B of GS 145-1, each pole shall be capable of withstanding, without showing any signs of failure, a force *F* calculated in accordance with the appropriate formula given in annex C of annex B of GS 145-1. The force *F* corresponds to a minimum fibre stress (in bending) of 55 MPa. See Annex A.1(c).

4.4 Freedom from defects

4.4.1 Sapwood

When determined, the minimum radial width of the sapwood in a pole shall be at least the minimum radial penetration of preservative given in column 3 of table 3. Sapwood shall not have been removed to such an extent that the remaining width of sapwood is less than

Table 3a - Dimension of Southern Pine, Douglas Fir (Coast), Carribean Pine and Slash Pine Poles

(Based on a Fibre Stress of 55.3N/mm²)

Class		1	2	3	4	5	6	7
Minimum Circumference at top (mm)		685	635	585	535	485	435	380
Length of Pole (m)	Groundline distance from Butt* (m)	Minimum Circumference at 1.8 m from Butt (mm)						
8	1.5	870	820	760	705	655	605	560
9	1.5	925	870	805	750	690	640	595
10	1.8	960	900	840	780	720	670	620
11	1.8	1000	940	875	815	750	695	645
12	1.8	1040	975	910	845	780	725	670
13	2.0	1070	1000	935	870	810	745	695
14	2.0	1105	1035	960	895	835	770	715

* The figures in this column are intended for use only when a definition of groundline is necessary in order to apply requirements relating to scars, straightness, etc.

Table 3b - Dimension of Red Pine (USA) and Radiata Pine (Chile) Poles

(Based on a Fibre Stress of 45.5N/mm²)

Class		1	2	3	4	5	6	7
Minimum Circumference at top (mm)		685	635	585	535	485	435	380
Length of Pole (m)	Groundline distance from Butt* (m)	Minimum Circumference at 1.8 m from Butt (mm)						
8	1.5	935	870	810	755	700	650	600
9	1.5	985	920	860	795	735	685	630
10	1.8	1030	955	895	830	765	710	655
11	1.8	1065	990	925	860	800	735	
12	1.8	1110	1035	960	895	830	770	
13	2.0	1145	1070	995	925	860	795	
14	2.0	1180	1105	1025	950	885		

* The figures in this column are intended for use only when a definition of groundline is necessary in order to apply requirements relating to scars, straightness, etc.

Quality control procedures for wood treatment plants (extract)

GHANA STANDARDS AUTHORITY

GHANA STANDARD

GS 146-1:2007
2nd Edition

TIMBER AND SAWN LOGS - CODE OF PRACTICE FOR WOOD TREATMENT PLANTS:

PART 1:
QUALITY CONTROL PROCEDURES FOR WOOD TREATMENT PLANTS

ICS 79.020 Ref. No. GS 146-1:2007

withheld until the preservative and retention are found to conform to specifications.

3.6 When it becomes evident that any phase of production does not comply with the requirements of GS 144:1992 and or GS 145-1:1992 or customer's specification, the Quality Control designee shall notify management and corrective measures shall be instituted.

3.7 The Quality Control designee shall not release any material for delivery to the customer or for inspection until he is satisfied that the material complies with the customer's specification.

4. Material pre-treatment quality control

4.1 Plant Quality Control designee shall determine that all materials have been stored in accordance with GS 145-1:1992 and good manufacturing practice while under plant control and prior to preparation for treatment.

4.2 Plant Quality Control shall determine that all materials comply with GS 144:1992 and/or GS 145-1:1992 or the customer's specifications.

5. Plant Gauges and Recorders

5.1 Plants shall be equipped with pressure and vacuum during each cycle of treatment. Plant shall also be equipped with pressure and vacuum gauges and also for checking the accuracy of the recorders.

5.2 All recorders, thermometers and gauges, including work-tank float or patent gauges, shall be tested and certified for accuracy by a qualified person at the time of installation and annually thereafter. Whenever there is evidence of malfunction, which cannot be corrected by simple adjustment, the instrument or gauge shall be promptly repaired or replaced and re-certified for accuracy.

5.3 Certified calibration tables of measuring or work tanks shall be conveniently displayed.

In the event of any damage or alteration to a work tank that may cause error in the gauge reading, the tank shall be re-calibrated and certified.

5.4 Recording instruments shall be compared during different stages of treatment with the indicating gauges and thermometers. The recorder reading shall be within the tolerances given below.

(a) Thermometers - recording instrument and the thermometer shall agree within 3 degree Celsius.

(b) Pressure Gauges - The recording instrument and the pressure gauge shall agree within 0.35 Bar.

(c) Vacuum Gauges - The recording instrument and vacuum gauge shall agree within 30 mm Hg.

5.5 Calibration of thermometers and gauges as required under 5.2 shall be made as follows:

(a) Thermometers - Compare with thermometer of known accuracy and allow a variation not exceeding 1 degree Celsius (1^0C)

(b) Pressure Gauges - Compare with standard test gauge or suitable gauge testing device and allow a variation not exceeding 0.2 Bar.

(c) Vacuum Gauges - Compare with a mercury column and allow a variation not exceeding 3 mm Hg.

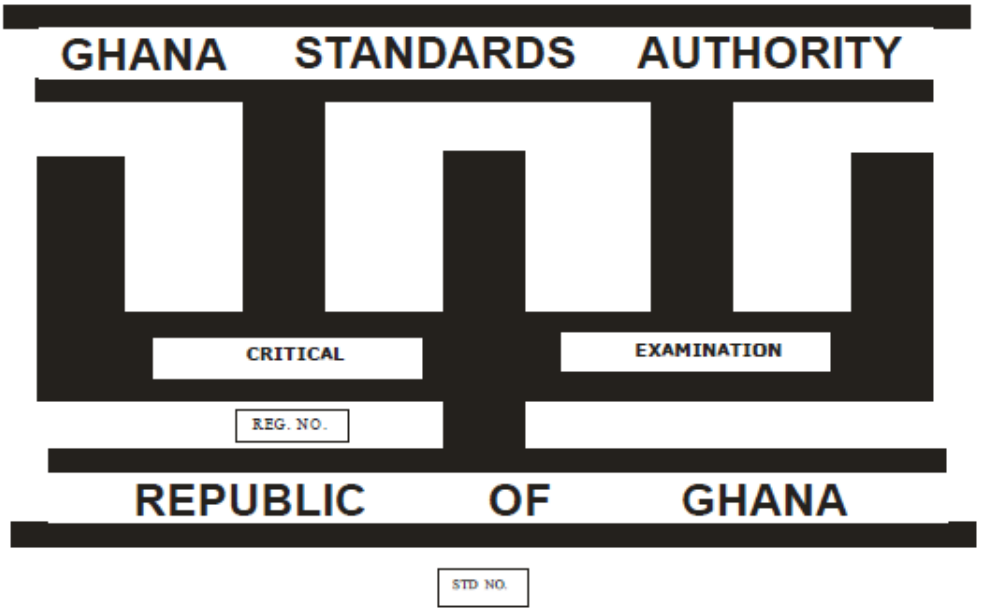

Figure 2 - An Illustration of the Layout of Information for Company Registration Number (REG. NO.) And Ghana Standard Number (STD. No.) on Mark of Conformity

THE GHANA STANDARDS CERTIFICATION MARK

For further information on the Ghana Standards Certification Mark Scheme, please contact:

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Quality control and inspection of timber products (extract)

GHANA STANDARDS AUTHORITY

GHANA STANDARD **GS 146-2:2007**
2nd Edition

TIMBER AND SAWN LOGS - CODE OF PRACTICE FOR WOOD TREATMENT PLANTS –

PART 2:
QUALITY CONTROL AND INSPECTION OF TIMBER PRODUCTS

ICS 79.020 **Ref. No. GS 146-2: 2007**

GHANA STANDARD GS 146 -2: 2007

Timber and Sawn Logs - Code of Practice for Wood Treatment Plants – Part 2: Quality Control and Inspection of Timber Products

1. Scope

This standard describes the responsibilities and procedures pertaining to the quality control and inspection of timber products by treatment companies. Compliance to this standard is necessary in order to assure quality and reliability of treated timber products specified in GS 144:1992 and GS 145-1-1: 1992.

2. Normative references

The following standards contain provisions which through reference in this text, constitute provisions of this standard. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below.

2.1 GS 144:1992 - Ghana Standard Specification for crossarms for overhead power and telecommunication lines.

2.2 GS 145-1: 1992 -Ghana Standard Specification for wood poles for overhead power and telecommunication lines.

2.3 GS 146 - 1: 1992 - Code of practice for wood treatment plants: Quality control procedures for timber products

3. Definitions

For the purpose of this standard, the following definitions apply:

3.1
inspection
an examination of material in sufficient detail to ensure conformity to all phases of the specification under which it was purchased. Inspection prior to treatment after the products are manufactured and ready for treatment

3.2
customer inspection
customer inspection relates to examination of a lot of material by an inspector or an inspection agency employed by the customer

3.3
certificate of compliance
certificate of compliance shall consist of a certificate over the signature of an authorized employee of the producer that the material delivered meets the requirements of this specification and any supplementary requirement cited in a contract or order under which it was purchased

4. General Requirements

i. Quality control is the responsibility of general management of the treating company. However, an adequately trained member of staff shall be charged with the responsibility for exercising quality control procedures.

Table - 1: Sample Size and Allowable Number of Defectives

LOT SIZE	SAMPLE SIZE	ALLOWABLE NUMBER OF DEFECTIVE CROSSARMS
1-30	ALL	0
31-50	30	0
51-100	37	0
101-200	40	0
201-300	70	1
301-500	100	2
501-600	125	3
601-800	130	3
801-1000	155	4
1001-2000	180	5
2001-4000	210	6
4001-5000	235	7
5001-10000	260	8

4.1.2.1 Ends of Crossarms

Surface inspection of the ends shall be made on all crossarms. This is usually done on the stacks of arms prior to the manufacture. Particular attention shall be paid to defects commonly found in the ends such as reaction wood, decay, shakes and splits, scantiness and honeycomb.

Whenever the number of non-conforming is found to exceed 0.5% of the lot or one crossarm whichever is greater, the entire lot shall be rejected. After the producer has removed or marked out the defective material, the arms may be resubmitted.

4.1.2.2 Surface of crossarms

Surface inspection of the lengthwise side shall be performed on a random sample. The inspector shall examine side surfaces from a position at the middle of the arm as it is slowly rotated for him. When necessary rotation may be stopped for closer inspection. Whenever the number of non-conforming arms are found to exceed the allowable number in Table 1, the entire lot shall be rejected. After the producer has removed or marked the defective material the arms may be resubmitted.

Particular attention should be paid to the following provisions:

4.1.2.2.1 Decay

Arms showing decay as indicated by discolouration, punky and spongy wood, or other evidence of actual decay shall be rejected.

4.1.2.2.2 Knots

Knots shall be considered separately with regard to number, size and location of single knots. The sum of the knot diameters or knot cavities in any zone shall include all those over 10mm in diameter.

4.1.2.2.3 Reaction wood

Reaction wood on the side surface is indicated by an inspection of the end to determine the presence of true reaction wood.

Dupaul wood treatment plant assessment report in 1988 (extract)

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DUPAUL WOOD TREATMENT (GHANA) LIMITED

Prepared for

Agency for International Development
AFR/MDI
(Contract No. AFR-0438-C-00-5037-00)
Task Order No. 40

Prepared by

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September 1988

I. INTRODUCTION

This is the report of a mission to Ghana, carried out by an independent consultant, Tener Eckelberry, for the International Science and Technology Institute, Inc. The scope of work consisted of a reconnaissance study of a Ghanian wood products company, Dupaul Wood Treatment (Ghana) Ltd., and included the following assessments;

-- Dupaul as a supplier for a major Bangladesh transmission pole contract.

-- Dupaul's financial, technical, and overall capabilities; management, assets, location, marketing and customer base.

Dupaul that would prevent it from achieving necessary competence levels.

If Dupaul was to be found weak, the consultant was to advise as what might be done to bring Dupaul up to strength.

The field portion of the Mission took place from August 22nd through August 29th. Two and one-half days were spend in Accra, and three and one-half days were spend in Takoradi, the site of the factory. Takoradi has the largest port in Ghana. It is approximately 145 miles west of Accra. Most of Ghana's wood exports are shipped from Takoradi.

The mission was carried out for the Office of Market Development and Investment of the Agency for International Development's Bureau for Africa under Contract No. AFR-0438-C-00-5037-00, Task 40.

III. CONCLUSIONS

Our major, overriding conclusion is that this company has a very large potential for growth, profit, and a worthwhile social contribution to make to Ghana. We therefore recommend that immediate detailed studies be made, with the object of justifying complementary investment.

However, there are a number of important conditions, in our opinion, that must be met for new investments to be justified, and we have outlined these below.

SPECIFIC CONCLUSIONS

1. The Pole Business is a presently viable one, and should remain so:

   Using present equipment and installations coming on stream, the Pole Division should be able to turn out 30,000 poles annually. This quantity, based on current prices, results in net annual sales revenues of approximately $2,760,000, yielding an operating profit-before depreciation, interest and corporate income taxes (not applicable for five years, as the Company has been granted a tax holiday) -- of approximately $800,000 or about 29% of sales. Of this figure approximately $570,000 will be available in foreign currency. (Chapter IV)

   As explained below, productivity of the pole treatment plant can be increased by one third with relatively small additional investment.

2. The critical Bangladesh order will probably be successfully filled, assuming that the current working capital squeeze is relieved.

   While this key order is behind schedule, work is proceeding apace to meet the following new deadlines:

   (Loaded Takoradi)

4,000 poles	end Sept. 1988
4,000 poles	end Dec. 1988
10,000 poles	by end April 1989

   A good deal of professional assistance is being applied to this project, including the physical presence in Takoradi of two Bangladesh experts seconded from the customer, and an American transmission pole expert, Robert Page.

IV. TREATED POLES

PROJECTED INCOME STATEMENT

Net Revenues	$ 000	
50% Export	1,425.0	
50% Domestic	1,337.0	
Total	2,762.0	
Costs-Raw Materials		
Poles	207.0	
Chemicals	683.8	
Total	890.8	
Operating Costs		
Transport	581.5	
Labor	115.0	
Utilities and Maintenance	30.0	
Overheads	346.0	
Total	1,072.5	
Total Costs	1,963.3	
Operating Profits Before: Depreciation Interest Taxes	798.7	28.9% of Sales
Of which "retained" in overseas Dollar account:	570.0	

Assumptions used:

1. Sales will be divided equally between exports and the domestic market - 15,000 poles each.
2. Prices used are $100 per pole for exports, and 22,000 cedis per pole for Ghana.
3. The exchange rate used is 260 cedis to $1.00.
4. No provision has been made for top management compensation.