

# Exploring the barriers to the use and potential of timber for housing construction in Ghana

B.K. Baiden \*, E. Badu, F.S. Menz

*Department of Building Technology, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana*

Received 10 November 2003; received in revised form 30 July 2004; accepted 3 August 2004

Available online 28 September 2004

## Abstract

Timber, a renewable resource readily available in Ghana has structural, non-structural and decorative advantages as a building material. In recent times, however, it has been regarded as old fashioned and faces replacement by other “modern” materials. This research therefore examines the key barriers inhibiting the use and potential of timber for housing construction. Questionnaires were administered to the general public, timber processing firm and timber-constructed household and analysed using a descriptive statistical method. Key barriers to timber design and housing construction were then identified through semi-structured interviews with Architects. Timber house construction in Ghana has declined due to psychological and technical barriers. Psychologically, there is the fear of possible damage by insect and destruction by fire. Technical barriers that exist include depletion of the timber reserves, lack of design and detailing, ineffective treatment timber, and the absence of skilled tradesmen.

© 2004 Elsevier Ltd. All rights reserved.

*Keywords:* Barrier; Building materials; Ghana; Timber housing; Renewable resource

## 1. Introduction

Timber is one of Ghana’s most readily available natural resource where the forest occupies one-third of her total area and has about 400 timber species [1]. There are also a number of timber companies, which produce timber to the required sizes in commercial quantities. Two high-level educational institutions; Building and Road Research Institute (BRRI) and Kwame Nkrumah University of Science and Technology (KNUST), perform various tests on timber for use in construction. The construction of timber houses in Ghana has, however, declined substantially in proportion to other types.

The use of timber for the construction of houses has faced many challenges in recent years. Other materials such as sandcrete blocks, concrete blocks and bricks have

replaced timber as main building construction materials. Existing timber houses constructed, which have lasted for tens of years and are still standing, attest to timber’s durability and its potential as a building material. The call for more timber housing construction has not been realised because for the past years almost all buildings in Ghana are constructed of sandcrete blocks.

The choice of a material for the construction of buildings depends on factors such as the availability of the material, the ease with which it can be worked, the speed of fabrication and erection and the tolerance it provides. It is therefore regrettable to note that even though Ghana has abundant timber resources, their use in the construction of buildings is limited to windows, doors and roof members. Timber is also a renewable resource and can be available for use over a longer period through proper replacement programme.

This research investigates the barriers that have contributed to the decline in the number of timber houses in Ghana. Views of the general public, timber constructed

\* Corresponding author. Present address: 51 Rendell Street, Loughborough LE11 1 KLJ, UK.

*E-mail address:* [bkbaiden@yahoo.com](mailto:bkbaiden@yahoo.com) (B.K. Baiden).

households, timber-processing firms were gathered using structured questionnaires. A descriptive statistical method was used to analyse the responses. Semi-structured interviews were then conducted with Architects to identify significant barriers to the design and construction of timber housing. Properties that make timber a good building materials and availability of suitable species in housing construction are highlighted. Problems, defects and risks associated with the construction, use and maintenance of timber houses are then discussed to identify the barriers. The study was conducted in the Kumasi (6°54'N 1°35'E) metropolis where a significant number of timber-constructed houses over 40 years old and habitable can be found. The metropolis also has a proportionally large number of timber processing firms in Ghana.

## 2. Timber availability

The timber producing forest of Ghana occupies an area of approximately 78,000 km<sup>2</sup>, about one-third of the total area of the country [1]. The timber resources are estimated at about 350 million cubic metres of the total are considered to be matured stock. There are over 250 wood species that grow to timber size in the forests of Ghana [2].

Timber species are grouped into primary and secondary categories. There are 14 primary species of major economic value (based on export potential) and about 12 species of lesser economic value. Most of these are durable woods with established properties. They are processed mainly for export in the form of logs, lumber, veneer and plywood. There are 23 secondary species are made up of about species of possible future economic value, and over 200 hundred others that are not well known. The properties of these woods have therefore not been sufficiently studied. They are consequently considered to be relatively less durable (although there are a few durable ones). On the other hand, the secondary species are in abundance and have the potential of being a great source of material for the construction industry in Ghana.

The wood-processing industry has long been established in the country. There are about 70 sawmills in the country, conveniently located in the forest zones. These mills process almost exclusively primary species. The annual production rates from the mills are listed in Table 1.

The above discussion clearly shows that the raw material potential of the country, which can support a major timber construction development, is vast. Researchers have, however, had difficulties in getting data on physical and mechanical properties of most timber species because of the confusion of local names, specific trade or standard names and botanical names [3].

Table 1  
Timber production in Ghana

Region	Annual processed volume (m <sup>3</sup> )		
	Log	Lumber and plywood	
		Export	Local use
Eastern	52,000	1500	20,000
Western and Central	290,000	103,000	31,000
Brong-Ahafo	85,000	31,000	10,000
Ashanti	278,000	76,000	40,000
Total	705,000	211,500	101,000

Source: Forest Products Research Institute [8].

## 3. Timber usage

Timber products used in the construction industry may be classified into two main categories of end use: structural and non-structural. Structural timbers are normally used for structural construction such as load bearing wall, frames, roof trusses, columns, floor systems and beams. Non-structural timbers are, however, used for wall sidings, paneling, ceiling, floors, doors and windows frames.

Not all of the available timber species from the tropical rain forest are suitable for construction [3]. For use in construction of building elements, however, the choice of species are determined by strength in tension, compression and shear. Other factors are natural durability, easily treatment and seasoning, workable, availability and attractive appearance. Even though wood has its limitation due its susceptibility to decay and insects attack, the number of inherent factors above, keep it in the forefront of building materials [4].

## 4. Timber properties

Timber constructed house of the conventional type can also be built to last for a period of 40 to 100 years, and many examples of these exist in some parts of Ghana [5]. This is because timber is a versatile material and this is demonstrated by the wide variety of species, which exhibit desirable properties [6] as discussed below.

### 4.1. Durability

The durability of timber is often discussed with reference to its resistance to fungi, decay and insects over time when in contact. In the absence of fungi or insect attack, timber is remarkably resistant and will survive for long periods of time. Examples of well preserved items now over 200 years have been found in Egyptian tombs [7]. Treating the timber with chemicals, which are toxic to fungi and insects, can significantly enhance the natural durability of timber. Resistance to decay

متن کامل مقاله

دریافت فوری ←

**ISI**Articles

مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات