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## A REVIEW OF SUSTAINABLE MAINTENANCE MANAGEMENT OF PUBLIC HEALTHCARE FACILITIES IN DEVELOPING COUNTRIES: THE CASE OF GHANA

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### Abstract

The maintenance management of healthcare facilities is a multifaceted field of facilities management due mainly to the complexity of the building designs and service systems and shortage of maintenance budget. Most public hospitals in Ghana are faced with the challenges of inadequate maintenance budget, bad management, staff supervision challenges, inadequate technical know-how in equipment usage and poor maintenance culture. Thus it is essential to research on how maintenance management service quality of public hospitals in Ghana impact on user satisfaction. This paper seeks to review detailed service quality and customer satisfaction concepts. Secondly, the study outlines and discusses the different concepts of buildability, sustainability, and maintainability in the lifecycle of a healthcare facility. Up to date literature review was based on articles from 2000 to 2015. The paper brings together research on service quality assessment and customer satisfaction assessment applied within healthcare maintenance management. Particularly, the healthcare industry can improve the service quality and ultimately customer/user satisfaction through the concept/indicators of buildability, sustainability and maintainability. With the application of SERVQUAL and good management procedure such as the PLAN-DO-CHECK-ACT model, authors propose a concept to optimise these, from the building design stage through the construction to the operation and maintenance of healthcare facilities. This paper can be used by stakeholders of public healthcare facilities: government, hospital management, and users as an important reference on sustainable maintenance management to achieve better service quality and in so doing increase customer/user satisfaction.

**Keywords:** *Customer Satisfaction, Service Quality, Maintenance Management; Sustainability; Maintainability, Buildability*

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### 1.0 INTRODUCTION

One of the most complex fields of facilities management is the maintenance management of Hospital facilities. This is due to the multifaceted nature of the hospitalisation buildings, the importance of the electrical and mechanical system and maintenance budget challenges (Shohet, 2006). According to Lennerts *et al.* (2005) a hospital is deemed an exceptional facility is that, it has to operate at its best at every moment in time and also, an error in a hospital can be fatal. Rani *et al.* (2015) therefore stated that hospitals need to strategically transform the traditional methods of maintenance practices to achieve better performance of the facilities.

Maintenance which was seen as a “necessary evil” some years back is now understood as a strategic importance for most organisations the world over (Fraser *et al.*, 2015). Thus in a healthcare environment, a well planned maintenance strategy will help improve energy efficiency as well as comfort, health and safety of the occupants and the environment (Shohet and Lavy, 2004; Herman, 2011). The solution is to promote an environment and support systems that minimise the risk of harm despite the complexity in modern health care (WHO, 2007), as any shortfall in the required service standards of the critical services can have dire consequences on the health of patients (Bakker *et al.*, 2013). Therefore the maintenance managers of

healthcare facilities need to address challenges from the maintenance, repair, and cleaning of buildings to budget management. Maintenance work must be strategically addressed based on how significant the task is and the availability of maintenance funds (Straub, 2003; Zawawi *et al.*, 2011).

## **1.1 The Case of Ghana**

Healthcare services all over the world are faced with maintenance resource management challenges (Ogembo-Kachieng'a and Ogara, 2004). However, According to Abousi and Atinga (2013) the various interested parties in the health sector; including government, institutions and healthcare users have increased their call for higher service quality as all healthcare consumers prefer quality services that ensures value for money (Lee *et al.*, 2000).

To meet the global call for quality healthcare, Ghana has gone through numerous reforms to develop the healthcare sector. One major improvement according to Atinga *et al.* (2011) is the enactment of the medium-term health policy between 1997 and 2001 by the Ministry of Health (MoH) with the sole aim of increasing basic healthcare access whilst consolidating health facilities service delivery. Healthcare provision in Ghana has brought immense increase in the willingness of both public and private service providers to increase their service quality to meet the agenda of national policies on healthcare (Atinga *et al.*, 2011). In Ghana, the public hospitals though not fully profit oriented, always complain about lack or delay of government support and inadequate internally generate funds (IGF) to operate effectively.

The problem is that most of the public hospitals in Ghana are ill equipped. This is due mainly to inadequate maintenance budget, perceived bad management, lack of supervision of staff, lack of knowledge and skill in usage of equipment, poor maintenance culture and apathy of staff due to lack of motivation from management and government (health.ghanaweb.com, Ghana Health Service, 2003, 2007; MoH, 2007a; 2007b). Research by Abousi and Atinga (2013) on healthcare quality generally or the correlation between healthcare service quality and patient satisfaction precisely

point to the fact that patients' view of the quality of healthcare service has a strong effect on customer satisfaction. However, they came to the conclusion that patients are not satisfied with the level of healthcare in Ghana, especially that of public hospitals.

## **2.0 LITERATURE REVIEW**

This research aims to assess literature on the sustainable maintenance management practices of health facilities (hospitals). It also reviews the concepts of service quality and customer satisfaction and focus on the method used to evaluate healthcare maintenance management. The study also outlines and discusses the different concepts of buildability, sustainability, and maintainability in the lifecycle of a healthcare facility.

### **2.1 The Concept of Service Quality**

Service quality, which is one of the most researched areas in service management literature, is deemed a vital concept for service providers (Sureshchandar *et al.*, 2002). Service quality is known to have a constructive influence on strategic success factors of organisations including customer satisfaction (Olorunnivo *et al.*, 2006; Bakti and Sumaedi, 2013); customer loyalty (Nagata *et al.*, 2004; Clemes *et al.*, 2008) and customer trust (Moliner, 2009). Most researchers have indicated how important the quality of service is to healthcare institutions. According to Choi *et al.* (2004) service quality affects perceived value and patient loyalty.

According to Kitapsi *et al.* (2014) service quality concept can be assessed under two universally accepted schools of thought on service management, namely the Nordic school view as propounded by Grönroos (1984) and the American school view by Parasuraman *et al.* (1988). The former describes service quality centered on practical and procedural features whilst the other agrees on five service quality measurements tools, propounded by Parasuraman *et al.* (1988):

1. Tangibles (Infrastructure, equipment, and conduct of staffs);
2. Reliability (Capability to execute the assured service reliably and perfectly);
3. Responsiveness (Readiness to aid customer and offer ready service);
4. Assurance (Understanding and courteousness of staffs and their capacity to inspire hope and assurance);
5. Empathy (Helpful, personalized care the organisation offers its customers).

According to Parasuraman *et al.* (1988) Service quality is the difference in the service that customers' expect and how they perceive the actual service quality. They propounded an innovative Gap Model (SERVQUAL), which is seen as one of the major models or scales used in conceptualizing service quality (Svensson, 2006; Chowdhary and Prakash, 2007; Hamer, 2006). According to (Saunders, 2008), Parasuraman *et al.* (1988) indicated that service quality is grounded on multi-faceted factors which can be applied in various areas. In the healthcare services context, research has shown the important role of service quality. Choi *et al.*, (2004) established that the quality of service has a positive impact on patients perceived value loyalty. Moliner (2009) and Kumar *et al.* (2013) stated that service quality has a positive impact on patient trust. Public healthcare studies have been done by Aagja and Garg (2010); Andaleeb and Millet (2010); Manaf (2005) and that of private healthcare by Andaleeb and Millet (2010) indicates that empathy and assurance dimensions has an effect on patients loyalty.

## **2.2 Customer Satisfaction**

Customer satisfaction is one well researched component in marketing literature and has been essential to the marketing concept for some decades (Angelova, 2011). With time, it has been applied in hospital evaluation of patient satisfaction amongst others. According to Yang and Peterson (2004), different researchers have tried to define the customer satisfaction concept. Although Tsiotsou (2006) stated a generally agreed definition is yet to be arrived at, Shabbir *et al.* (2016) stated customer satisfaction is a product of the observed performance and

expectations. Oliver (1997) and Zeithmal and Bitner, (2003) indicated customers are said to be satisfied if perceived performance is greater than expectations whereas if it does not, it leads to dissatisfaction of customers. Therefore, patient satisfaction is a significant factor in healthcare setting because it measures user/patient satisfaction or disappointment ensuing for relating services perceived performance (Salisbury *et al.*, 2005; Wu *et al.*, 2008; Habbal, 2011).

Satisfaction is an immediate response to consumption, while service quality is interpreted as the overall impression of a customer's judgment regarding service provided (Hussain *et al.*, 2015). Wilcox *et al.* (2011) and Tian-Cole and Crompton (2003) however, indicated service quality is a cognitive attitude while satisfaction is an affective attitude. SERVQUAL model is viewed as a good tool to explain customer satisfaction with the service quality of maintenance management of health facilities (Atinga *et al.*, 2011). This paper therefore looks at ways of examining the model together with suggested areas to improve its applicability in healthcare maintenance management. The four gaps between what customers expect and what they perceive as propounded by Zeithaml *et al.* (1990) is assessed and adjusted to suit the study on sustainable maintenance management of healthcare facilities to achieve optimum service quality to achieve user satisfaction:

Gap 1: Maintenance Management team does not know the service quality level users expect.

Gap 2: Maintenance Management team is not willing or able to put the systems in place to match or exceed customer expectations because there is no set service quality benchmark.

Gap 3: There is a gap in maintenance service performance due to the inability of the Maintenance Management team to perform optimum maintenance service.

Gap 4: When the promised maintenance service quality do not match delivery.

In addition to service quality, the healthcare facilities itself also contribute to patients' satisfaction with healthcare delivery.

### **3.0 BUILDABILITY, SUSTAINABILITY AND MAINTAINABILITY OF HEALTHCARE FACILITIES**

Though it is true that good patient care comes from dedicated individuals, it is equally true that the physical structures and hospital environment must address the safety and well-being of patients (Adenuga, 2012). However, buildings are not always managed and maintained with the care required. In many instances, maintenance of buildings is either lacking or completely absent (Liias, 2005). Shohet (2003) indicated that many factors affect the management and operation of hospital buildings. This comprise tangible hospital occupancy compared to scheduled occupancy, age of the infrastructure, building environment, managerial resources investment and labour sources for maintenance implementation (be it in-house or out-sourcing).

*How then does the design, construction and operation of a healthcare building affect its maintenance management?*

According to Adejimi (2005) although poor functioning of buildings is usually linked to inadequate maintenance management, it is arguable whether the precise maintenance issues in some buildings cannot be traced to certain intrinsic design factors and construction as well as operation of the building. Maintenance challenges, in most cases could have originated from inappropriate planning by the architect who designed it. Therefore, from inception, care must be taken to address building low points where there is the high tendency for major future maintenance needs to avert such future breakdowns (Adejimi, 2005). It is therefore vital to appreciate the issues and concepts that influence building maintenance management of healthcare facilities from the cradle to the grave.

### **3.1 The Effect of Buildability on Healthcare Maintenance Management**

Buildability is the extent that the design of a building aid how easily it can be built based on the total requirement of the end product (Mbamali, 2005). This implies there are a number of requirements to consider in a design before it could be said to be buildable (Construction Industry Research and Information Association – CIRIA, 1983). Buildability factors may not be the same for all countries as a result of site conditions differences, existing building expertise, and the accessibility of supplies, equipment and skills (Ly, 2015). According to Shohet and Lavy (2004), Shohet (2006), Chew *et al.* (2007), and Adenuga (2011) the building, management, and repairs of a healthcare facilities is very complex and entails specialised consultations. Therefore, because they can be easily damaged, the design, construction and especially finishes selected must be functional, durable, and economical to maintain (Milner and Narayan 2005). The issue of buildability is important as studies by De Jager (2007) indicate that there is a correlation between healthcare service delivery and the healthcare building. Kessler (2011) stated a pleasant and clean healthcare environment has a positive impact on patient satisfaction and the apparent healthcare quality experience. It furthermore increase staff performance and job satisfaction, and makes hospitals more patient friendly (Stankos and Schwarz, 2007).

In addition to it being easily buildable, another factor that needs careful consideration is how sustainable the healthcare facility is due to the importance this will have on the building running cost, especially during its operation, management and maintenance phases.

### **3.2 The Need for Sustainability in the Design, Construction and Management of Healthcare Facilities**

Sustainable development is achieved when the quality of life is improved to enable people enjoy the best presently without impacting negatively on the life of the future generations (Ortiz *et al.*, 2009). With time, this principle was introduced into the construction industry (Miller *et al.*, 2014). The emphasis of building design

optimisation for sustainability is mostly focused on making the building energy efficient in its operation (Kreiner, 2015). Studies over the past decade indicate that the throughout its life cycle, buildings account for approximately 40%–50% of the overall global energy usage and greenhouse gas (GHG) emissions (Miller and Doh, 2014). Therefore when building designers take into consideration the concept of sustainability during the design and construction phases, operational efficiencies are improved with the outcome being a life cycle energy reduction (Crawford, 2011; Zuo *et al.*, 2012; Lepech *et al.*, 2014). To achieve ideal sustainability performance and stakeholder interests, it is very imperative to ascertain suitable procedures that can increase the sustainability of buildings (Kreiner *et al.*, 2015).

Sustainability in healthcare facilities aims to create better hospital environments. According to Pheng and Rui (2016) sustainability in healthcare maintenance management offers the prospect to study from best practice hospitals and to achieve improvement, in addition to stimulating competition and innovation. To achieve sustainability, good service quality and user satisfaction; service goals should be based on both customer standards and hospital standards (Pheng and Rui, 2016).

### **3.3 Maintainability in the Design, Construction and Operation of a Healthcare Facility**

According to Chew (2010) “maintainability is the capability to attain the best performance throughout the lifecycle of a building or component at the minimum life cycle cost”. Maintainability if neglected at the design and construction stages will result in buildings that are difficult or costly to maintain”. Frank (2013) indicates maintainability in building design is achieved when the design is conscious of the ease, safety and cost of maintenance, whilst not compromising building standards and quality. Therefore to achieve maintainability, Seeley (1987) stated designers ought to find answers to how building elements and components can be reached for maintenance works, how it can be cleaned, what is its lifespan and how it can be changed when it outlives its usefulness.

Therefore, the harder the maintenance or replacement of a component or element is, the better the quality of the original work should be (Ferguson, 1989).

Maintainability is however more manifested in healthcare physical maintenance with the service quality focusing on the hospital developing pleasant environs (Brady and Cronin, 2001; and Kang and Jeffrey, 2004), well arranged bed-layout, well-equipped rooms, upholding washrooms and toilets hygiene and locating dustbins in corridors to increase patient satisfaction (Chahal and Mehta, 2013). Atinga *et al.* (2011) acknowledged that maintaining good service quality of a healthcare facility produces an exceptional prospect to meet or surpass patient expectations; increases patients’ mood and morale as well as that of healthcare providers; and increases the value of other functions performed by the hospital and customer satisfaction.

## **4.0 METHODOLOGY**

The methodology adopted was the review of literature on sustainable maintenance management to analyse the factors that the proposed framework seek to apply as the main variables. The authors conducted a keyword search of Scopus and Emerald databases mostly, with keywords to identify a total of over 100 articles in about 30 academic journals from 2000 to December 2015. Firstly, the combination of keywords “service quality” and “customer satisfaction”, “buildability”, “sustainability”, and “maintainability and “healthcare maintenance management” in searching the article topic. Secondly, every article was examined by content to ensure their relativity to sustainable maintenance management of healthcare facilities. Thirdly, the study evaluates these variables of the review and merges them into one framework. The underlying principle is that whereas sustainable maintenance management is impacted by buildability, sustainability and maintainability from the cradle to the grave of healthcare facilities, it must all culminate in good maintenance service quality which can be evaluated by users of the facility.

## 5.0 PROPOSED FRAMEWORK

Combining all the concepts discussed in literature, the proposed framework (Figure 1) is based on the assumption that the concepts of buildability, sustainability and maintainability from the cradle to the grave of healthcare facilities have an impact on quality of sustainable maintenance service which also affects the user satisfaction of the healthcare facilities. In the demonstration of the applicability of buildability principles to healthcare facilities, observations should be made under the following headings:

- i. Foundation and substructure;

- ii. Superstructure;
- iii. Services;
- iv. Finishes and fittings

These four headings are further broken down into its constituent details. In all situations, simplicity, workability and cost saving without compromising on aesthetics and quality must be the guiding principles. The guiding questions are: how can the building elements and components be reached for maintenance works? How can building elements and components be cleaned? How long will building elements and components last? How can the building elements and components be replaced at the end of its useful life?

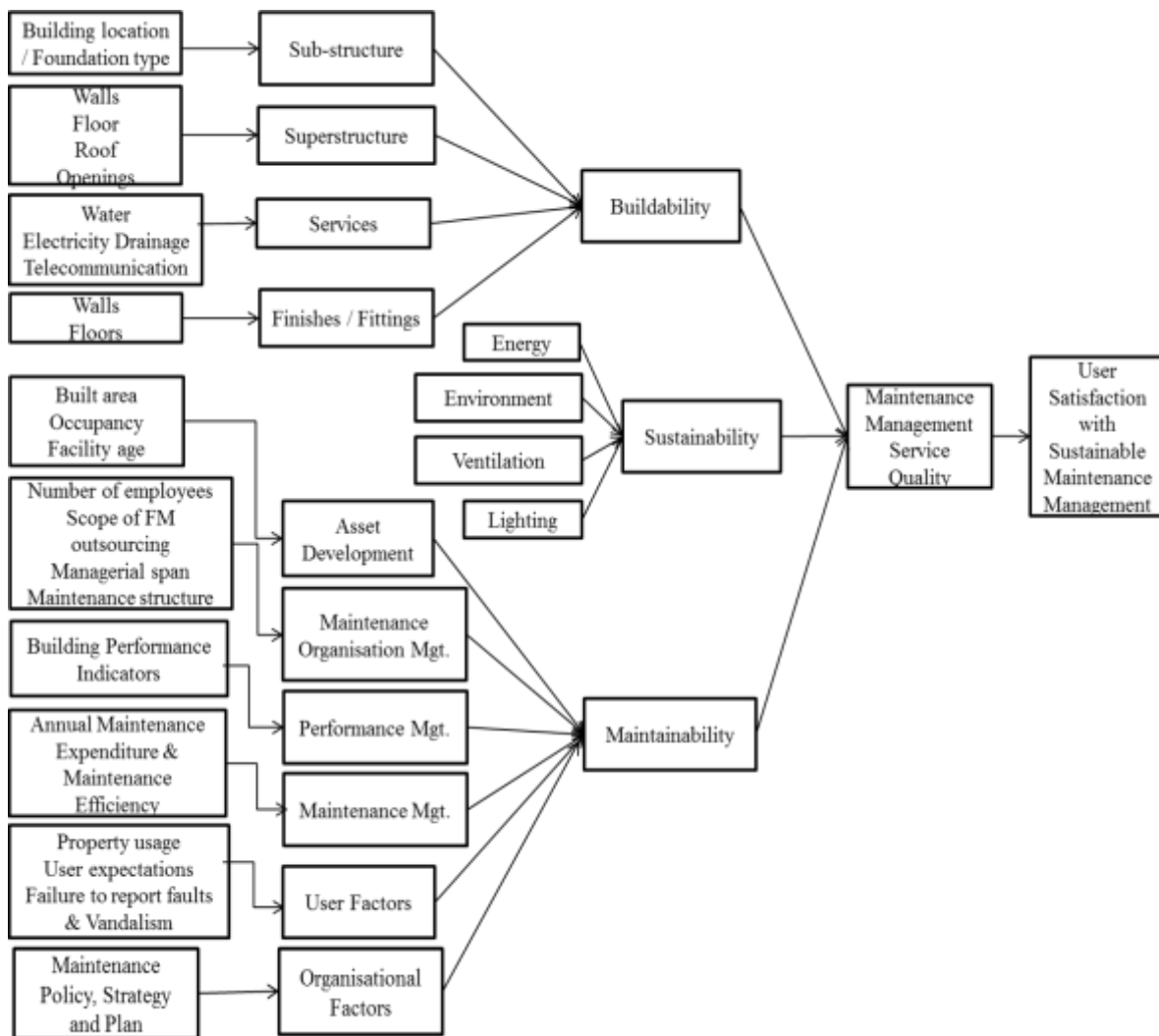


Figure 1 Proposed Sustainable Maintenance Management Framework.

Sustainability factors that ought to be considered include but not limited to building energy savings, healthcare environment, natural ventilation and natural lighting. This is even more important due to the criticality of the mechanical and electrical system of healthcare facilities. In developing countries in general and Ghana in particular these sustainability factors are important due to the unreliability of electricity and the ever increasing cry of inadequate maintenance budget.

Maintainability is discussed grounded on the Key Performance Indicators (KPIs) propounded by Shohet and Lavy (2004) and Shohet (2006). Their study identified four KPI's that affect maintenance management of health facilities in Isreal. These include, Asset Development, Organisation Management, Performance Management and Maintenance Management. In addition to these four KPI's the authors propose an additional two KPI's namely User factors which include user expectations, usage of the facilities, inability to report faults in a timely manner and vandalism by users. The second KPI that has been introduced is Organisation factor based on the need for strategic maintenance management that will see maintenance needs being addressed at the strategic and operational levels in the healthcare facilities in line with the organisational goals.

This framework can be used by stakeholders of public healthcare facilities: government, hospital management, and users as an important reference on sustainable maintenance management to achieve better service quality and in so doing increase customer/user satisfaction. To rationalize the framework, we recommend that the framework at every point should be developed using the basic Plan-Do-Check-Act model. This will help ensure the continuous cycle of planning, implementing, assessing and improving every phase of the framework. In future research, the proposed dimensions will be statistically validated through Structural Equation Modeling resulting in a streamlined framework with specific dimensions that are significant to all stakeholders.

## **6.0 CONCLUSION**

Some of the issues of maintenance management of public health facilities arise because of lack of knowledge. Thus, this study will benefit three key stakeholders: government, staff and workers and the patients/users of the public health facilities. The government will be made aware of strategies that will best address the sustainable maintenance management of healthcare facilities, the workers and maintenance team will be able to plan their maintenance management prudently to preserve their reputation as they work in the facilities due to good maintenance management practices. Moreover, the patients/users of the public health facilities will also benefit because in addition to dedicated healthcare staff, the healthcare infrastructure and environment also contribute to the comfort health and wellbeing of patients.

However, there is very little empirical research addressing patients' perceptions and expectations of their healthcare maintenance service quality in Ghana. Additionally, the distinct concepts that specifically determine perceived healthcare maintenance management quality are rare in the literature on developing countries especially those in Africa in general and Ghana in particular. The limitation of the study is that whereas the study can hold in most settings, the challenge of regional and ethnic differences in addition to individual healthcare facility challenges may make the application of the framework not hold in all situations unless some distinct changes are made to some of the variables under study.

In conclusion, the sustainable maintenance management of public health facilities is multi-faceted and can only be addressed when the government and the management and maintenance management team decide to address the situation in the right way. It is better to have proactive maintenance work rather than reactive work, whilst taking into consideration services quality and users satisfaction

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