



Evaluation Of Criteria For Procurement Of Building Maintenance Services In Public Universities In Ashanti Region, Ghana

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Abstract: The built environment accounts for a sizable amount of a nation's investments, but if it is not properly maintained, the vast sums of money spent on building infrastructure could be wasted. Therefore, maintaining these infrastructure, which include the buildings of public universities, is crucial if they are to fulfill their intended purposes. It is interesting to note how previous studies have focused on maintenance practices in Ghana but failed considerably to investigate the criteria for procurement of maintenance services. In a bid to filling this gap, this study seeks to evaluate the criteria used in preparing building maintenance service procurement in public universities. The study used a cross-sectional survey involving 40 facilities and maintenance officers from the three public universities in the Ashanti Region. The study concludes that, public universities within Ashanti Region in most cases adopt the Hybrid Approach of procurement of maintenance services. The study further revealed that, criteria such as the need to focus on core business; staffing flexibility, expertise and work quality were influential in the preparation of the maintenance procurement strategy of the Universities. The study further revealed that, the criteria considered in the preparation of the maintenance service procurement strategy has improved access to labour, the quality and reliability of maintenance services, and improved response to emergency maintenance. The study recommends a repetition of this research in all public universities to obtain rounded view of the criteria considered by these universities in the preparation of their maintenance service procurement strategy.

KEYWORDS: Procurement Criteria, Building Maintenance Services, Ashanti Region, Ghana

1. Introduction

Physical infrastructure forms a significant fraction of a country's investment (Issahaku, 2013). According to Nkrumah *et al.*, (2017), the huge investment in public infrastructure could be wasteful if these infrastructures are not well-maintained. Accordingly, it is important that these infrastructures which include public universities buildings are maintained for them to perform the functions for which they were built. Buildings are essential for production which every organization needs in order to work efficiently and effectively towards achieving set goals. Thus, without property, organizations cannot function well, as every activity in the organization requires space in order to take place. According to Ali (2009), "property is often seen as the second or third largest operating cost of a business or public authority and may represent as much as fifty per cent (50%) of the total assets on the balance sheet and therefore contributing to the wealth of organizations".

Public universities for instance, have buildings used as lecture halls, offices for lecturers, administration and sometimes residential buildings to accommodate staff members. Adenuga *et al.*, (2007) observe that educational facilities, particularly buildings, require a good level of maintenance all year round, and as such authorities should place a high premium on maintenance services in such facilities to meet appropriate standards (for accreditation purposes, health and safety of users). Maintenance practices are therefore needed in order to keep, restore and improve existing building infrastructures to meet appreciable standards over time (Nkrumah *et al.*, 2017). Stated differently, the influx of private universities in recent times has put most public universities on their toes on the need to be competitive. Building facilities play a major role in achieving the level of competitiveness required, hence making maintenance of such properties unequivocally important.

Atkins and Brooks (2015) are of the view that, the quest for a maintenance service procurement strategy that enables organisations to effectively address all maintenance needs is crucial in the agenda of becoming competitive. Over the years, four major strategies for procuring maintenance management strategies have evolved in addressing organisations' maintenance needs. These include the in-house approach, outsourcing, the hybrid approach, and the hierarchical approach. The in-house approach makes use of staff who have been directly employed by the organisation to execute maintenance services whereas outsourcing deals with the use of workers who are outside the organisation in the execution of maintenance services usually under a contract (Atkins and Brooks, 2015) The hybrid approach also occurs when the organisation uses a combination of in-house and outsourced staff in handling the maintenance tasks (Turrell, 1997). Under the hierarchical approach, the in-house staff only handles the strategic trust of maintenance which is in the form of policy determination whereas the outsourced workers are solely deployed in the execution of the maintenance services. The choice of any of these maintenance procurement strategies plays a major role in the maintenance of buildings and its services. Maintenance services can be identified and effectively prepared, however in the absence of a proper strategy, these services would be derailed (Atkins, 2003). An appropriate maintenance service procurement strategy will provide a framework for the execution of the maintenance needs of an organisation to ensure that service delivery standards are met.

The studies of Cobbinah (2010), Nkrumah *et al.*, (2017), and Adenuga and Iyagba (2005) have revealed that most public organisations either outsource all their maintenance services to external artisans or use in-house staff only or in some cases a combination of in-house and outsourced workers. Since the use of these maintenance service procurement strategies are guided by a set of criteria this study is designed as a follow-up to the previous studies particularly to evaluate the various criteria used by public organisations in the choice of their maintenance service procurement strategy. From this background, the study investigates the various criteria used in the choice of maintenance service procurement strategy in public universities.

According to Knight (2006) and Ahadzie and Amoah (2010), building maintenance practices, particularly, in the educational sector continue to receive significant attention, as it is important that maintenance service

procurement strategy associated with buildings, particularly, in the educational sector are critically analyzed and examined (Issahaku, 2013, Afrane and Osei-Tutu, 1999). Roblyer *et al.*, (2013) pointed out that the growing student population in public universities have increased the rate of use of educational buildings in recent times. For public universities to create conducive environment to promote learning activities, an effective maintenance service procurement strategy is required (Nkrumah *et al.*, 2017). Elickson, (2013); Booty (2009) and Sherman, (2007) note that effective maintenance management goes beyond ordinary maintenance of properties based on complaints from occupiers and extends into procurement of maintenance services within a regime of a sound strategy. The development of a maintenance procurement strategy is thus necessary as it reduces waste and helps organisations to focus on prioritized activities (Cobbinah, 2010; Nkrumah *et al.*, 2017). In some cases, the maintenance process breaks down due to the implementation of a maintenance service procurement strategy that does not respond effectively to the maintenance needs of the organization, mostly resulting from the adoption of a poor set of criteria in designing the maintenance service procurement strategy (Sani, 2012). Sometimes also management complain of lack of funds for emergency maintenance request as such services were not considered during the design of the maintenance service procurement strategy (Cobinah, 2010). The criteria for preparing a maintenance service procurement strategy is therefore essential in ensuring that all maintenance services are effectively responded to.

Notwithstanding the importance of strategy in the maintenance of organisational properties, studies on the criteria used in the preparation of maintenance service procurement strategy is scanty. For instance, the studies of Odediran *et al.*, (2012). Afrane and Osei Tutu (1999) and Agyefi-Mensah *et al.*, (2012) all focused on the effect of the lack of maintenance on the performance of organisations. Furthermore, the studies of Aris (2006), Barimah (2005), Nkrumah *et al.*, (2017) and Afare (2003) also dealt with the maintenance practices in public sector organisations and their effect on the condition of buildings. These studies were however conducted in non-educational institutions. Cobinah (2010) also investigated the effectiveness of maintenance practices in multi sector public organisations which featured only one educational institution among five public organisations. It is interesting to note how these previous studies have focused on maintenance practices but failed considerably to investigate the maintenance service procurement strategies adopted by these public organisations. The previous studies aforementioned suggest that a research gap exist in the area of maintenance service procurement strategy, particularly, in public universities in Ghana, which this research intends to fill. Accordingly, the studies investigate the key criteria used by public universities in the Ashanti Region in designing their maintenance procurement strategy.

2.0 Literature Review

2.1 The Concept of Maintenance

Several concepts and definitions have evolved overtime on the subject of building maintenance. The British Standard (BS3811) defines maintenance as comprising of actions that are technical and administrative in nature for proper functioning of buildings. The Committee of the Department of Environment (CDE) (1972) cited in Seeley (1993) also defined maintenance as services carried out to keep, restore or to improve a building facility. Scarett (2001) stresses on the need for improvement used in the definition of the CDE as buildings have a long physical life. Scarett (2001) further argue that building maintenance is necessary to meet health and safety regulations, increase the rental potential of buildings, and to project corporate image of organisations. Scarett (2001) point out that for organizations to realise the value of building maintenance, there is the need for sound maintenance management practices that would oversee the planning, organising, directing and controlling of maintenance services within organisations. Scarett (2001) further points to the need to maintain buildings to an acceptable standard, meaning the performance of buildings must satisfy existing human, legal and environmental

standards. Aside the notion of acceptable standard, important words such as 'restore' and 'retain' are used in the definition of maintenance. The idea of 'retain' brings to bear the concept of preventive maintenance as services required to avoid future failure are carried out. The idea of restoring a building also reflects the concept of corrective maintenance as services are carried out to correct identified defects/failure in a building facility. In this regard Lahm and Ham (2005) are of the view that for the standards of building to be acceptable they must perform their required functions and be in conformity to contemporary design relevant health and safety statutes.

According to Richard *et al.*, (2017) maintenance services that are carried out in a building could take the nature of regular cleaning and repair services, inspection, and testing. To Richard *et al.*, (2017), the concept of maintenance should encompass the idea of retaining or restoring a building facility to a good condition. In recapitulation Quinn (1999) concludes that whichever nature maintenance services take, it should embody all the physical and administrative works to identify and correct defects, to prevent the failure of building components and to improve the functional performance and value of a building facility.

2.2 Classification of Maintenance Services

Maintenance services carried out in a building could be classified according to the frequency and the nature of work. Rodriguez and Padron (2005) are of the view that such classifications are necessary in organisations to clearly identify and establish the frequency of carrying out such services. Rodriguez and Padron (2005) classify all maintenance services into major and minor maintenance services. According to them major maintenance services include renovation, refurbishment, and rehabilitation programs designed to significantly alter the structure of a building facility. Such services constitute a major overhaul to the structure of the building and usually requires huge capital sums. Organisations must therefore prepare adequately and must clearly establish frequencies or periods in which to carry out such capital improvements.

Minor maintenance services on other hand include servicing, rectification and replacement programs designed for the proper functioning of the building facility. According to Quinn (1999) these services do not require a major overhaul to the structural elements of a building unlike major maintenance services. Servicing include all works such as routine/day-to-day cleaning, sweeping, mobbing, and removal of cobwebs among other activities to ensure that the building serves its day-to day purposes (Lind and Muyingo, 2009). Rectification normally occurs during the design stage of the building process particularly when some of the designs do not fit into the functional requirement of the building and as such, the designs need to be corrected. Some need for rectification includes installation defects and incorrect assembly, unsuitability of components and damage of goods during carriage. (Guilding, 2003).

Replacement programs are designed for building components, particularly when components become obsolete and needs to be replaced (Powel and Watson, 2006). Replacement is a very significant aspect of maintenance as almost all the problems to do with maintenance come from non-replacement of spoilt items (Powel and Watson, 2006). Replacement is required in instances such as leaking roof, obsolete door, defective water taps and faulty door locks. Furthermore, due to the physical obsolescence that occurs in the components of a building during its life cycle, it is imperative for maintenance managers to design an efficient replacement programme over the life of the building.

2.3 The Concept of Maintenance Management

Maintenance differs from maintenance management. According to Seeley (1993), maintenance is reflected in the various services that are required for proper functioning of a building facility. However, such services must be overseen under the umbrella of the functions of management (Seeley,1993). Consequently, within the context of management, maintenance management is seen as a process of planning, organising, directing and controlling all

the technical and administrative actions required for the proper functioning of a building facility (Seeley, 1993). According to Seeley, planning is done at the strategic level, where an organisations carefully identifies its maintenance objectives, and the drafting of policy to oversee the maintenance of property. Organising includes issues such as making available the material, labour, and tools required to effectively carry out maintenance services. Organising also includes the scheduling of maintenance services, and the times for embarking on such activities. Directing also connotes the idea of assigning roles and responsibilities within the context of carrying out maintenance services. Directing also establishes the levels of authority and systems of reporting in the implementation of maintenance actions. Finally controlling deals with the establishment of standards for measuring the performance of maintenance services. It also establishes procedures for the implementation of maintenance actions, monitoring and evaluation. In addition to these, Henley *et al.*, (2004) established a positive relationship between value and the quality of organisations' properties. Thus, the higher the quality, the higher the value and vice-versa. Henley *et al.*, (2004) further stress that an increment in organisations' properties values should be underpinned by a corresponding improvement in quality (a phenomenon easily detected by guests). For this reason, organisations' properties managers should not be reluctant to allocate capital to improve organisations' properties, as such capital allocations would bring a corresponding increase in the value of these organisations. Also due to the varied levels of competition in the current business environment, maintenance managers should embark on continuous maintenance programs that would improve their average standard rating (Henley *et al.*, 2004).

2.4 Procurement of Maintenance Services

Marquez (2007) defines a maintenance service procurement strategy as the policy adopted for the execution of maintenance services. The emphasis on this strategy is on the implementation of the maintenance services identified and not the overall maintenance management strategy. Consequently, maintenance services could be identified as planned or unplanned, however the strategy for executing the identified maintenance services is more centered on the personnel, times, and equipment required for carrying out the identified maintenance services. From this perspective therefore, a maintenance service procurement strategy addresses the issue of the one who carries out the maintenance work and how the work is carried out (Marquez, 2007). There are generally four strategies of procurement for maintenance services namely, the In-house, outsourcing, hybrid (of in-house and outsourcing), and the hierarchical strategies (Richard *et al.*, 2017). Keller *et al.*, (2011) observe that, there are no hard and fast rules concerning what should be kept in-house or contracted outside. Rather there is a need to define thinking, practice and procedures that would lead to best value for the organisation (ibid). Accordingly, Henley *et al.* (2004), assert that, the decision to use any of these strategies should be made having regard to the path that leads to long term best value for the organisation. Adenuga *et al.*, (2007) support this view by stating that, the choice of any of these strategies may be made taking full account of the implications, especially, the true cost of all the options. These strategies are further explained in the succeeding sections.

2.5.1 The In-house Strategy

The In-house approach involves the provision of maintenance services by a dedicated resource directly employed by the client organisation, where monitoring and control of performance is normally conducted under the terms of conventional employer/employee relationship, although internal service agreements may be employed as regulating mechanisms (Chan *et al.*, 2003, Hassanien and Lookeset, 2006). Chan *et al.*, (2003) also view the in-house strategy as the use of directly employed staff of an organisation in the conduct of maintenance services. In-house maintenance procurement strategy involves the use of traditional in-house staff proficient to offer and manage maintenance services. The in-house maintenance manager has the responsibility to plan and manage the rapport with various artisans and contractors. They supervise the ongoing maintenance of facilities in the organization and manage any partnering agreements involved in the procurement of maintenance services (Atkin

and Brooks, 2009). The in-house maintenance manager moreover has the role to establish, monitor and bring up-to-date excellent measures, retain control of any actions not established, supervise and hand over at the end of the contract and uphold an appropriate level of expertise in the management team. The study of Wise (2007) reveals that, most organizations that have outsourced on the premise of saving cost ultimately did not apprehend the expected cost savings as outsource service providers do also have profit motive.

2.5.2 Outsourcing

Outsourcing is made up of two words – “out” and “sourcing”. Sourcing refers to the act of transferring work, responsibilities and decision rights to someone else”. Consequently, Donada and Nogatchewsky (2009) define outsourcing as the process of contracting an external person/firm to see to all or some aspects of the maintenance of a building facility. According to Peters and Peters (2003), companies in some instances outsource because there are others who can do it cheaper, faster, and better. Outsourcing could therefore be defined as “the allocation of risk and responsibility for performing a function or service to another entity” (Atkins and Brooks, 2015). Thus, outsourcing in maintenance is the process of delegating maintenance services required within an organisation to a third party, usually a specialised maintenance management firm who can do it better, cheaper and faster. According to Lam and Han (2008) it is advantageous in that the firm is engaged in a wide range of activities relating to maintenance and usually maintains a highly experienced and motivated team. Also, the approach is highly favoured where the property portfolio to be maintained is located in different geographical areas (Hasanien and Lookeset, 2002). It may be economical to appoint private firms in the localities to maintain the property on behalf of the organisation (Lam and Hann, 2008). However, there may be no confidentiality as the parent company’s policies may be known by a number of organisations (Quinn *et al.*, 2006). Also, the change of the team may not foster building background knowledge about the property portfolio being maintained (Lind and Muyingo, 2011).

2.5.3 The Hybrid Strategy

This strategy involves the use of both in-house and outsourced staff employed in different proportions to carry out maintenance services within an organisation (Quinn, 2006). Richard *et al.*, (2017) stress that, the balance between the two staff groups is determined by the organisations’ maintenance policy as well as the requirement of more specialised maintenance expertise in aspects of organisations’ operations. Consequently, the in-house staff could outweigh the outsourced staff or vice-versa. The duties and responsibility of both the in-house and appointed agent are clearly spelt out, but the two are working together on the range of management task. This approach is advantageous in that the organisation has access to the expert knowledge from an outside organisation which adds to the in-house team (Lind and Muyingo, 2011). Nevertheless, this approach requires a high degree of cooperation between the two teams in order to attain the needed results (Hasanien and Lookeset, 2002). This approach entails the utilization of a combination of internal and external staff, each assigned varying responsibilities in providing maintenance services within an organization (Quinn, 2006). Richard *et al.* (2017) emphasize that the distribution of these two staff categories is influenced by the maintenance policy of the organization and the need for specialized maintenance expertise in different operational areas. As a result, either the internal staff may outnumber the outsourced staff, or vice versa. The roles and duties of both the internal employees and contracted agents are clearly defined, but they collaborate on a variety of management tasks. This method offers the benefit of tapping into the specialized knowledge of an external organization to complement the internal team (Lind and Muyingo, 2011). However, successful implementation of this strategy requires a high level of collaboration between the two teams to achieve the desired outcomes (Hasanien and Lookeset, 2002). Indeed, many institutions and businesses tend to adopt a hybrid model that incorporates aspects of both roles.

2.5.4 The Hierarchical Maintenance Strategy

The hierarchical approach, is the instance where the in-house staff only handles the strategic trust of maintenance, whereas the outsourced workers are solely deployed in the execution of the maintenance services. (Tsang *et al.*, 2002). Usually the in-house manager drafts policy guidelines to be followed by the outsourced staff (Lam *et al.*, 2010). He also controls the activities of the appointed outsourced company (Lam, 2007). According to Leimeister (2010), this approach helps to build a centralized and goal-oriented maintenance management system that fully controls the organization's maintenance services irrespective of who maintains the individual properties. Turrel (1997) underscores that, the organisation also enjoys expert knowledge from the outsourced organisation. Conversely, there should be a precise contract between the parties setting out the agent's roles in order to avoid misunderstandings.

2.6 Criteria for Procurement of Maintenance Service

The criteria for effective maintenance management of building stock have been well-established over an extended period, yet achieving optimal practices is not universally attained (Turrell, 1997). To evaluate performance and establish priorities, maintenance managers must take into account organizational requirements, including the functionality and performance of buildings. These standards should not be solely reliant on user perceptions and preferences (Chanter and Swallow, 1996), highlighting the significance of proper sequencing in maintenance management.

The effectiveness and efficiency of maintenance management operations for buildings, assets, and infrastructure are somewhat dependent on factors such as building condition information, sector or organizational expectations, and the services provided for each maintenance task (Zulkarnain *et al.*, 2011). Several studies have identified a disconnect between organizational strategy and maintenance procurement strategy, often attributed to maintenance staff overly relying on technical expertise and behavior rather than aligning with core business objectives (Keller *et al.*, 2011). This disconnect may also stem from unclear or irrelevant core business objectives that do not prioritize building maintenance. According to Hicks (2004), some companies have yet to realize the benefits of establishing written missions, visions, goals, and objectives for their maintenance division. Those that have done so have predominantly focused on cost (Keller *et al.*, 2011), potentially leading to a maintenance division lacking business orientation. Conversely, an organization with excessive procedures may stifle workers' creativity, innovation, and initiative (Njuangang and Liyanage, 2012).

When selecting a maintenance service procurement strategy for a building, considerations must include the life cycle of building materials, services, installations, and the activities conducted within the building. In instances where materials have deteriorated, maintenance work is necessary to address these defects (Zulkarnain *et al.*, 2011). Maintenance management is influenced by organizational needs and strategies, relevant building or infrastructure status information for planning, and the lack of alignment between organizational and procurement strategies. Other factors include inadequate vision for maintenance, and the selection of maintenance strategies without considering life cycle aspects of materials, services, and spaces.

Atkins (2003) outlines key criteria for choosing maintenance strategies, emphasizing the importance of identifying required services to establish a balanced view of needs. Defining roles and skills necessary for services, with attention to costs and quality, is crucial for deciding between in-house or outsourced maintenance provision. Evaluating criteria for strategy selection should encompass both quantitative and qualitative measures to ensure the best value. While the criteria for maintenance procurement strategies are not exhaustive, previous studies have identified useful factors such as cost savings, staffing flexibility, expertise, tools, risk reduction, and core business focus (Leimeister, 2010; Chan *et al.*, 2001, 2003; Hasanien and Lookeset, 2009; Keller *et al.*, 2011;

Atkins et al., 2003b). These criteria should be carefully considered along with potential challenges when deciding on maintenance service execution strategies.

2.6.1 Cost Savings

According to Atkins et al. (2003b), cost management is a critical concern for most industries and a key reason for outsourcing maintenance services. This viewpoint is supported by Keller et al. (2011), who discovered that the expenses associated with in-house staff salaries and benefits (such as retirement plans, healthcare, and vacation time) may have become prohibitively high for companies to maintain. As a result, organizations opt to fully outsource their maintenance services to external maintenance firms. Marquez (2007) further emphasizes that cost is also influenced by a contractor's ability to promptly address maintenance needs compared to in-house staff, making cost a relative matter. Nonetheless, Keller et al. (2011) clarifies Marquez's (2007) perspective by noting that in some cases, in-house staff can complete tasks more efficiently than outsourced companies, ultimately saving time and money. Moreover, Marquez (2007) highlights that the expense of hiring in outsourcing is assumed by the contractor. By taking on the cost of hiring skilled workers such as masons, electricians, plumbers, and carpenters, the organization can concentrate on its primary operations. Additionally, financial obligations like workers' insurance costs are shouldered by the outsourced company, reducing the financial burden on the contracting organization.

Atkins et al. (2003b) introduces a contrasting view on cost by suggesting that outsourcing maintenance services may actually be more expensive than keeping services in-house. This is due to the costs associated with hiring workers, providing employee benefits, and addressing other financial obligations, which may prompt contractors to raise service costs, ultimately driving up maintenance expenses compared to the in-house staff, hence the issue of cost becomes a relative subject. However, Keller *et al.*, (2011) explains the view of Marquez (2007) by observing that, sometimes, the in-house staff are able to execute work much faster than the outsourced company, saving time and hence money. Additionally, Marquez (2007) points out that, hiring cost in outsourcing is absorbed by the contractor. An outsourced contractor assumes the cost burden of hiring artisans like masons, electricians, plumbers and carpenters among others which allows the organization to focus on its core business. Also, other financial liabilities such as the cost of workers' insurance are borne by the outsourced company, which reduces the cost of the contracting organization. Atkins *et al.*, (2003b) offers a different perspective into the issue of cost by stating that, the cost of outsourcing maintenance services may be higher compared to in-house, as the cost of hiring workers, payment of workers' benefits, and other financial liabilities may force the contractor to increase the cost of executing maintenance services, hence increasing the cost of maintenance services.

2.6.2 Staffing Flexibility, Expertise and Work Quality

The research conducted by Adenuga et al. (2007) and Atkins et al. (2003b) demonstrates that outsourcing contractors offer the advantage of flexibility by quickly providing the necessary staffing levels and skill sets at a reduced cost and time commitment. Hasanien and Lookeset (2006) and Tsang (2002) note that outsourcing maintenance services allows for the utilization of specialized services as required, eliminating the need to invest in developing internal competencies that may not be consistently needed. According to Chan et al., (2001), the expertise of internal staff in specialized maintenance services significantly influences managers' decisions to engage outsourced personnel for some or all maintenance tasks. Furthermore, Coetzee (1999) discovered that the expertise brought by external contractors has a positive impact on the quality of work performed. Chan et al., (2003) suggest that in certain markets and locations, the availability of skilled craftsmen may be limited, making it difficult to acquire the necessary skill sets or resulting in higher costs in the long term. Coetzee (1999) observes that in such constrained markets, it may be more economically viable to have an in-house team rather than outsourcing, especially when there is a consistent need for regular and emergency maintenance services. Coetzee (1999) observes that, in such markets where expertise is limited, having an in-house staff would make more economic sense than contracting external organisations, especially when organisations have need for more regular and emergency maintenance services.

2.6.3 The Desire to Focus on Core Business

Guiding (2002) and Lamminmski (2008) are of the view that the management of organisations is characterized by so many managerial issues and activities. As such organisations cannot effectively respond to all these areas of business in addition to building maintenance. As a way of shifting the burden of maintenance in order to effectively concentrate on the core competencies of management, organisations may outsource building maintenance to special contractors. Thus, outsourcing maintenance services reduces the intensity of labour under the control of managers (Rodríguez and Padron, 2005).

2.6.4 Personnel Issues

The quest for organisations to remain outside the administrative issues of maintenance workers account for the choice of outsourcing as a strategy for executing maintenance services. Chan *et al.* (2003) and Atkins *et al.* (2003b) observe that, the pursuit of organizations to distance themselves from the operational intricacies of maintenance workers leads to the decision to outsource as a strategic approach for carrying out maintenance services. According to Chan *et al.* (2003) and Atkins *et al.* (2003b), it is noted that in most cases, when an organization opts to fully outsource its maintenance function, issues such as personnel grievances, disciplinary actions, and other related matters become the responsibility of the contractor. Marquez (2007) further points out that internal tasks like payroll, timekeeping, labor relations, human resource management issues, benefits, and the like are managed by the contractor, thereby relieving management from the burden and time commitment associated with these tasks. This, in turn, allows management to focus on their strengths and key objectives to propel the business forward.

2.6.5 Tools, Equipment and Technology

Tools, equipment and technology play a vital role in organisations' quest to select an appropriate strategy for executing maintenance services. Atkins *et al.*, (2003) asserts that, an outsourced contractor can provide staffing well-versed in the usage of the most current technology, without the need of the company to provide training to the in-house staff in its use, or the cost of acquisition of the technology/equipment. In organisations where the latest technology and equipment are not available to the in-house staff, the hierarchical division becomes the most suitable option. This allows management to handle the policy aspects of maintenance, thus allowing the organisation to outsource the execution of the services to an external organisation that has the required tools, equipment and technology for carrying out the maintenance services.

The same principle applies to specialized tools and equipment, as the contractor would be responsible for providing the necessary tools and equipment to complete the required work. According to Chen (2001), while the provision of specialized tools by the contracted company may enhance the efficiency of maintenance services, it could also lead to an increase in the overall cost of outsourcing maintenance services. On a different note, Richard *et al.* (2017) argue that furnishing specialized tools and equipment for maintenance service execution could lessen the organization from the burden of acquiring such equipment and technology, as well as training in-house staff on their operation.

2.6.6 Control of Maintenance Staff

According to Atkins and Brooks (2015), control is a fundamental managerial function crucial for assessing productivity and providing guidance for re-planning. Atkins *et al.* (2003b) note that while outsourcing maintenance may be cost-effective, there are limitations when collaborating with contractors, such as the host company's lack of direct oversight and instruction of the workforce. Hasanien and Lookeset (2006) also argue that meeting all of a client's needs, like personnel flexibility or skill availability, within the host company's

expectations can be challenging in an outsourcing arrangement. Adenuga et al. (2003) further emphasize that differing approaches, management styles, and philosophies between the client and contractor can result in conflicts. Atkins and Brooks (2015) suggest that redundant roles within client and contractor organizations can increase overall costs. Redundant roles and responsibilities can lead to inefficiencies within the maintenance organization, causing an imbalance between supervisors and workers, conflicting priorities, and confusion.

2.6.7 Staff Turnover

Atkins *et al.*, (2003b) found that, in-house employees are inclined to have more years of service at a facility than employees of a contractor and know the business and its expectations better. This is a common issue for clients, as outsourced staff do not, as a rule, possess as much allegiance to the company (Chan *et al.*, 2003). As such, the intellectual knowledge possessed by in-house staff with regards to a site's maintenance function, equipment and business model is more readily lost when they leave, as their loyalty is more tenuous compared to outsourced staff. From the perspective that, in-house staff have extensive knowledge of the business and understand the short- and long-term objectives of the business, they are better positioned to deliver the short- and long-term maintenance objectives in line with the vision of the organisation (Atkins, 2003). Consequently, Hasanien and Lookeset (2006) observe the high level of productivity in using the in-house strategy compared to the other strategies. However, Chan *et al.*, (2003) are of the view that, specialized contractors are better equipped with flexible manpower that will ensure that tasks are completed on time.

2.6.8 Response Time to Maintenance Services

Delays in the execution of maintenance services could complicate the scale of future maintenance services. In this regard, managers are always searching for strategies that would improve the response time to maintenance services. According to Atkins *et al.* (2003b), when dealing with specialty contracts such as air conditioners, refrigeration and complex compressors, a response time to problems may be handled more rapidly in-house when compared with a phone call to an outsourced organisation. Keller *et al* (2011) are also of the view that, the host company must balance the needs of the site against the decision to outsource maintenance services and negotiate an acceptable response time for the delivery of the services. Since a longer response time equates to more downtime and lost production, this response time must be clearly defined in the contract, or the host company may be unable to meet their goals and objectives (Adenuga *et al.*, 2007).

Chan *et al.*, (2001) further point the constraints of time as another factor affecting the decision of organisations to adopt the outsourcing approach. They argue that since the main income of organisations especially those involved in commercial activities are from the rent, the provision of food and beverage service, and banking services, the non-functioning of critical equipment and functional areas in buildings will lead to a loss of income. It is therefore the responsibility of organisations to compare the time that would be used by the in-house staff and outsourced staff to complete maintenance services. Chan *et al.* (2003) in a separate study assert that outsourced staffs are able to complete work faster than in-house staff, and as such they may effectively suit maintenance services in business organisations.

2.6.9 Statutory Restrictions

Guiding (2002) also point to statutory requirements as a key determinant for the adoption of the approaches to maintenance management in organisations. Guiding (2002) indicates that local regulations may restrict the performance of some aspects of building maintenance (such as fire protection systems, lifts and escalators) by authorized contractors, in which case outsourcing would be necessitated.

3.0 Methodology

The study used the quantitative research approach, and the descriptive survey design for the study. Questionnaires were used to solicit for responses from the respondents of the study. Consent was obtained from the subjects themselves. The population of the study comprised of all the maintenance and estate managers of the three public universities in the Ashanti Region including Kwame Nkrumah University of Science and Technology (KNUST), University of Education, Winneba (UEW) (Kumasi Campus), and Kumasi Technical University (KsTU). The population of the staff in the estate department of each of these Universities is presented in Table 1.0

Table 1.0 Population of Staff in the Estate Departments of the Universities

University	Population
KNUST	15
UEW	12
KsTU	13
Total	40

Source: Field Survey, January 2024

From Table 1.0 it is observed that, the total population of the study is 40; however since the population is less than 100 all the 40 respondents were used for the study, hence a census study was conducted. Even though 40 questionnaires were administered, 35 were eventually received representing a response rate of 87.5%.

Given the nature of this study, only quantitative data was collected, which allowed for the deployment of quantitative data analyses techniques. The descriptive statistical tool as well as the Relative Importance Index (RII) was used in the analyses of the quantitative data gathered. The relative important index was therefore used to rank the criteria reviewed in literature. The Statistical Package for Social Scientists (SPSS) Version 21 and Microsoft Excel 2018 were deployed to assist in the analysis of the data collected. The study also used the Pearson correlation to measure the effect of the criteria for maintenance procurement strategy preparation on maintenance services execution.

4.0 Analysis and Discussion of Findings

This section presents the analyses of the data gathered from the respondents of the study. The analyses have been carried out with regard to the criteria that affect the preparation of the maintenance procurement strategy, and the effects of these criteria on maintenance services in the study organisations. In all, 40 respondents were selected for the study and a total of 40 questionnaires were accordingly administered. However 35 questionnaires were retrieved representing a response rate of 87.5%. This meant the majority of the respondents were used for the analyses, hence making the findings of the study reliable.

Table 1.1: Demographic background of managers

Items	Category	Percentage (%)
Years of Service	1-3 years	22.9%
	4-6 years	8.6%
	7-10 years	28.6%
	Above 10 years	40.0%
Education Level	HND	17.1%
	Bachelors' Degree	42.9%
	Postgraduate Degree	40.0%

Source: Field Survey, April, 2024

Table 4.1 indicates the findings in relation to the years of services of the managers. The study revealed that, the majority (40%, N= 14) of the respondents had worked for more than ten years. This was followed by 28.6% of the respondents with working experiences of 7-10 years. This means that, the majority of the respondents have adequate working experiences in relation to maintenance procurement strategy preparation in the organisation. For this reason, the study obtained a reliable information on the criteria that are used in the preparation of the maintenance procurement strategy. The study further revealed that, 42.9%, constituting the majority of the managers had Bachelors' Degree Qualifications, and a further 40% had postgraduate qualifications. The data implies that, the majority of the respondents were highly educated and for this reason, they were in a position to offer quality response in relation to the criteria that is used in the preparation of their maintenance procurement strategy.

4.2 Maintenance Services in the Public Universities

In a bid to determining the effectiveness of the maintenance procurement strategy, the various maintenance practices that are implemented in the institutions were identified. The practices covered the type of maintenance services, the availability of a maintenance programme, and the maintenance strategy used by the Organisation in addressing the maintenance needs. These practices are explicated in the succeeding paragraphs.

The study investigated the maintenance services mostly carried out in the Organisation to effectively determine which maintenance services delivery is affected by the maintenance procurement strategy. Analyses of survey data revealed the varied types of maintenance services carried out by the Universities. These included painting works, air conditioning services, electrical services, plumbing services, cleaning, and Janitorial services. The occupants were asked to use the scale 1-mostly not performed 2-not performed, 3-performed 4-mostly performed to indicate their opinion on the extent to which the aforementioned maintenance services performed in the Organisation. The result of the survey is presented in Table 1.2.

Table 1.2 Types of Maintenance Services Executed

	Mostly performed	not performed	Not regularly performed	Mostly performed	Mean	Standard deviation
	1 (%)	2 (%)	3(%)	4(%)		
Painting works	0	0	80.0	20.0	3.20	0.41
Electrical faults	0	0	40.0	60.0	3.60	0.5
Replacement Fixtures & Fittings	0	0	40.0	60.0	3.60	0.5
Room cleaning & Janitorial services	0	0	0	100.0	4.0	0.00
Plumbing works	0	0	20.0	80.0	3.80	0.41
Renovation	0	40.0	60.0	0	2.60	0.5

Source: Field Survey, April, 2024

The results in Table 1.2 suggest that, the organisation mostly embark on plumbing works as evidenced by a mean response of 3.80, which means that, on the average, the respondents almost agreed that, the Universities carryout plumbing services. This was followed by the replacement of fixtures and fittings, and repair of electrical faults, which were also evidenced by mean a response of 3.60. The mean responses suggest that, on the average, the replacement of fixtures and fittings, and repair of electrical faults were almost mostly executed in the Organisation. This implies that, the organisation mostly considers plumbing works, the replacement of fixtures and fittings and repair of electrical faults in the preparation of their procurement strategies for the execution of maintenance services.

4.3 Maintenance Service Procurement Strategy used by the Universities

Maintenance procurement strategy plays a huge role in the maintenance of buildings, the absence of which leads to the implementation of ad hoc management procurement methods, which ultimately are used in the execution of maintenance services. Accordingly, the study endeavoured to find out the maintenance procurement strategies often used by the universities in the execution of maintenance services. The results of this analysis are presented in Table 1.3.

Table 1.3 Procurement strategy adopted by public universities in Kumasi

Strategy	Strongly disagree 1(%)	Disagree 2 (%)	Neutral 3 (%)	Agree 4 (%)	strongly agree 5 (%)	Mean	Standard deviation
In-house strategy	.0	40.0	20.0	.0	40.0	3.40	1.38
Outsourcing	.0	100.0	.0	.0	.0	2.0	0.00
Hybrid Approach	.0	40.0	.0	20.0	40.0	3.60	1.38

Source: Field Survey, April, 2024

Table 1.3 shows that the various maintenance procurement strategies adopted by the universities in the execution of maintenance of services. The study revealed that, the universities mostly adopt a combination of the in-house and outsourced staff in the delivery of maintenance services. This was supported by a mean response of 3.60, which suggested that the average respondent almost agreed to the use of the in-house and outsourced staff in the execution of maintenance services within their universities. The study further found an average response of 3.40 and 2.0 for the use of only in-house and outsourcing respectively. This also suggested that, the respondents were unconvinced or completely disagreed that, only in-house or outsourced staff were used in the delivery of maintenance services. On the score of the data presented, it could be concluded that, the universities mostly adopt the hybrid approach to maintenance services delivery. According to Lind and Muyingo (2011), the use of the hybrid model helps organisations to effectively respond to the performance of their maintenance services function, particularly when the right balance is struck between the two categories of staff used in this model. Accordingly, the study asserts that, the use of the hybrid approach to maintenance services delivery should assist the Universities in responding effectively to their maintenance services.

4.4 Execution of Maintenance Services

The strategy for execution of maintenance services is an important determinant of maintenance cost. The maintenance procurement strategy clearly spells out which type of labour, whether in-house or outsourced staff, should be used in the execution of maintenance services. Accordingly, the study investigated the maintenance strategy adopted in the execution of maintenance services. The result of the survey is presented in Table 1.4

Table 1.4: Maintenance Procurement Strategy for the Execution of Maintenance Services

Maintenance work	Outsource %	In-house %	Total %
Painting works	30	70	100
Electrical fault	0	100	100
Fixtures & Fittings	0	100	100
Cleaning & Janitorial services	60	40	100
Renovation/Rehabilitation	20	80	100
Average	22	78	100

Source: Field Survey, April, 2024

It could be observed in Table 4.4, that the organisation make use of the In-house strategy in executing maintenance services relating to painting, electrical faults, fixtures and fittings, and major repairs. This is backed by the fact that an average of 78% of the maintenance services are executed by the in-house staff, whereas 22% are executed by outsourced staff. This results in an outsourced to in-house staff ratio of almost 1: 4, which means for every 5 maintenance workers there are four in-house staff and one outsourced staff in public universities in Kumasi. The study of Richard *et al.*, (2017) once again observed that, for efficiency in maintenance services delivery, a recommended outsourced to in-house ratio of 2: 3 is desirable. Given that, the study found this ratio to be 1: 4, the conclusion that could be drawn is a lower efficiency in the delivery of maintenance services in the Universities, when the ration is compared to that of Richard *et al.*, (2017).

4.5 Criteria that influence Preparation of the Maintenance Service Procurement Strategy

The maintenance procurement strategy is influenced by multiplicity of criteria. These criteria as reviewed in literature included the need to focus on core business, staffing flexibility, expertise and work quality, ability to control maintenance workers, response time to maintenance services, availability of tools, equipment and technology, staff turnover and quality of workmanship, statutory restrictions, cost savings, and personnel issues. The respondents were asked to use the scale *1-strongly disagree (SD)*, *2-Disagree (D)*, *3-Neutral (N)*, *4-Agree (A)* and *5-Strongly Agree (SA)* to indicate their opinion on the extent to which the aforementioned factors affect the maintenance procurement strategy. The result of the survey is presented in Table 1.5.

Table 1.5: Criteria for Preparation of the Maintenance Procurement Strategy

Criteria	SD (%)	D(%)	N(%)	A(%)	SA(%)	Mean	RII
	1	2	3	4	5		
Focusing on Core Business	0.00	0.00	0.00	100	0.00	4.00	0.80
Staffing flexibility, expertise and work quality	0.00	0.00	0.00	100	0.00	4.00	0.80
Ability to control maintenance workers	0.00	0.00	20.00	80	0.00	3.80	0.76
Response Time to Maintenance services	20.00	0.00	0.00	80	0.00	3.40	0.68
Availability of Tools, Equipment and Technology	0.00	20.00	20.00	60	0.00	3.40	0.68
Staff Turnover and quality of workmanship	0.00	0.00	60.00	40	0.00	3.40	0.68
Statutory Restrictions	0.00	20.00	40.00	40	0.00	3.20	0.64
Cost savings	20.00	0.00	20.00	60	0.00	3.20	0.64
Personnel Issues	0.00	40.00	20.00	40	0.00	3.00	0.60

Source: Field Survey, April, 2024

The study found out that, the criteria mostly considered in the preparation of the maintenance procurement strategy was the need to focus on core business; and staffing flexibility, expertise and work quality. As found in Table 4.5, these criteria had a mean response of 4.00 which means, on the average, respondents agreed that, the need to focus on core business; and staffing flexibility, expertise and work quality were key criteria considered in the preparation of the maintenance procurement strategy. These criteria were also associated with a Relative Importance Index (RII) of 0.80 which suggested that in about 80% of the time, the need to focus on core business; and staffing flexibility, expertise and work quality were considered in the preparation of maintenance procurement strategy, holding the other criteria constant.

The study further found that, ability to control maintenance workers was an important criterion considered in the preparation of the maintenance procurement strategy. This was evidenced by a mean response of 3.8 which means, on the average, maintenance officers agreed that, ability to control maintenance workers was a key criterion considered in the preparation of the maintenance procurement strategy. Ability to control maintenance workers was as the second most influential factor with a Relative Importance Index (RII) of 0.76 which suggests that in about 76% of the time, maintenance officers of the Organisation consider their ability to control maintenance workers in the preparation of the Organisation's maintenance procurement strategy.

Once again, the study revealed that, response time to maintenance services was an important criterion considered in the preparation of the maintenance procurement strategy. This was also explained by a Relative Importance Index (RII) of 0.68 which suggests that in about 68% of the time, maintenance officers consider response time to maintenance services in the preparation of the Organisation's maintenance procurement strategy, holding the other criteria constant as affirmed by Atkins (2003).

The study further revealed that, availability of tools, equipment and technology was an important factor considered in the preparation of the maintenance procurement strategy. This was backed by a Relative Importance Index (RII) of 0.68 which suggests that in about 68% of the time, maintenance officers consider availability of tools, equipment and technology in the preparation of the maintenance procurement strategy, holding the other criteria constant.

The study further revealed that, staff turnover and quality of workmanship was an important factor considered in the preparation of the maintenance procurement strategy. This was backed by a Relative Importance Index (RII) of 0.68 which implies that in about 68% of the time, maintenance officers consider staff turnover and quality of workmanship in the preparation of the Organisation's maintenance procurement strategy, holding the other criteria constant.

The study further revealed that, statutory restrictions was much considered in the preparation of the maintenance procurement strategy. This was backed by a Relative Importance Index (RII) of 0.64 which implies that in about 64% of the time, maintenance officers of the Organisation consider statutory restrictions in the preparation of the Organisation's maintenance procurement strategy, holding the other criteria constant.

The study further revealed that, cost savings was also an important factor considered in the preparation of the maintenance procurement strategy. This was backed by a Relative Importance Index (RII) of 0.64 which implies that in about 64% of the time, maintenance officers of the Universities consider cost savings in the preparation of the Organisation's maintenance procurement strategy, holding the other constant. This finding was also observed by Marquez (2007), for that matter, the study concludes that, the quest to cut-down the cost of executing maintenance services drives organisations in the preparation of their maintenance procurement strategy for maintenance services execution.

The study further revealed that, Personnel Issues was an important factor considered in the preparation of the maintenance procurement strategy. Personnel Issues was ranked as the sixth most influential factor with a

Relative Importance Index (RII) of 0.60 which implies that in about 60% of the time, maintenance officers of the Universities considered personnel issues in the preparation of the maintenance procurement strategy, holding the other criteria constant.

4.6 Effects of the Maintenance Service Procurement Criteria on Maintenance Delivery

This section examines the effects of the criteria considered in the preparation of the maintenance procurement strategy. Several performance criteria including access to labour, quality and reliability of maintenance services, response to emergency maintenance in the organisation, work turnover and completion rates have been positively affected by the maintenance execution strategy, continuity in the execution of maintenance services, and the extent of competitiveness achieved in the performance of organisations' core functions. The study argues that, the effectiveness of the maintenance procurement strategy adopted would have a corresponding improvement effect on the aforementioned performance indicators. Respondents were therefore made to use the **scale 1-strongly disagree (SD), 2-disagree (D), 3-neutral (N), 4-agree, and 5-strongly agree (SA)** to rate the effects of the criteria adopted for the preparation of the maintenance procurement strategy on these performance indicators. See Table 1.6

Table 1.6: Effects of the Maintenance Service Procurement Criteria on Maintenance Service Delivery

Measured Effects	SD	D	N	A	SA	Total (%)	Mean
	1 (%)	2(%)	3(%)	4(%)	5(%)		
Access to labour has improved due to the maintenance strategy adopted	0.00	0.00	20.00	60.00	20.00	100	4.00
The maintenance strategy adopted has improved the quality and reliability of maintenance services carried out in the organisation	0.00	0.00	20.00	80.00	0.00	100	3.80
The maintenance strategy adopted has improved response to emergency maintenance in the organisation	0.00	20.00	0.00	60.00	20.00	100	3.80
Maintenance work turnover and completion rates have been positively affected by the maintenance execution strategy	0.00	20.00	0.00	80.00	0.00	100	3.60
The maintenance strategy has improved continuity in the execution of maintenance services	0.00	20.00	20.00	60.00	0.00	100	3.40
The organisation has become more competitive in its core functions as a result of the maintenance execution strategy adopted.	0.00	20.00	20.00	60.00	0.00	100	3.40

Source: Field Survey, April, 2024

The study revealed that, on the basis of the mean response observed in Table 4.6, there has been an improvement in access to maintenance workforce; and the quality and reliability of maintenance of services, resulting from the criteria adopted in the preparation of maintenance procurement strategy. This was evidenced by a mean response of 4.0, which means that, the average respondent agreed that criteria considered in choice of maintenance

procurement strategy positively impact the number of workforce available for maintenance services. The correlation coefficients presented in **APPENDIX A** shows that, criteria such as personnel issues, availability of tools, equipment and technology, and response time to maintenance work positively correlate with access to maintenance workforce, as evidenced by correlation coefficients of 0.707, 0.791, an 0.791 respectively at p-values less than 0.05. This means that, in 70.7% of the improvement in access to labour could be explained by the organisations' ability to handle personnel grievances. Also 79.1% of the improvement in access to labour, could be explained by the availability of tools, equipment and technology; and response time to maintenance services. This finding relates with the findings of Chan *et al.*, (2003) who observed that, organisations that motivate staff and adopt sustainable methods of resolving employee grievances always have a high staff turnover ratio for the execution of maintenance services. From the evidence of the data collected and the findings from the supporting literature, it could be concluded that, maintenance procurement strategy criteria such as the availability of tools, equipment and technology, response time to maintenance services, and the ability to resolve personnel grievances significantly improves access to labour for the execution of maintenance services.

The study further revealed that, the criteria considered in the preparation of maintenance procurement strategy have resulted in improvement in the quality and reliability of maintenance of services. This was also supported by a mean response of 3.8, which means that, the average respondent almost agreed that, the quality of maintenance services have improved as a result of the criteria used in the preparation of the maintenance procurement strategy.

Once again from the correlation analysis, it was observed that, criteria such response time to maintenance services, and the availability of tools, equipment and technology with correlation coefficients of 1.00 and 0.875 respectively. This also implied that, 100% of the improvement in quality and reliability of maintenance services, could be explained by the quest to improve response time to maintenance services. Also, 87.5% of the improvement in the quality and reliability of maintenance services could be explained by availability of tools, equipment and technology. These findings relate with the study of Atkins (2003) who also found that, organisations are able to effectively respond to their maintenance needs on time, when the equipment required for the execution such services are available. Furthermore, the study of Adenuga *et al.*, (2007) revealed a positive relationship between the quality and reliability of maintenance services and response time to maintenance services. This suggests that, the faster organisations respond to their maintenance services, the quality and reliability of maintenance services are improved. A reconciliation of the data presented and the findings from literature suggest that, the availability of maintenance tools and equipment, and the quest to improve response time for maintenance have significant positive effect on the quality and reliability of maintenance services carried out in an organisations.

The study further found out that, the criteria considered in the choice of maintenance procurement strategy have resulted in improvement in response to emergency maintenance. This was also supported by a mean response of 3.8, which means that, the average respondent almost agreed that, response to emergency maintenance services have improved as a result of the criteria used in the preparation of the maintenance procurement strategy. From the correlation analysis, it was observed that, criteria such response time to maintenance services, the availability of tools, equipment and technology, and the quest to improve productivity and quality of workmanship with correlation coefficients of 0.919, 0.612 and 0.583 respectively. This also implied that, 91.9% of the improvement in response to emergency maintenance, could be explained by the quest to improve response time to maintenance services. Furthermore, 61.2% of the improvement in the response to emergency maintenance could be explained by availability of tools, equipment and technology, and 58.3% of the improvement in emergency maintenance was accounted for by the quest to improve productivity and quality of workmanship. These findings relate with the study of Atkins (2003) who also found that, organisations are able to effectively respond to their emergency maintenance needs, when the technology required for the execution such services are available. Furthermore, the study of Chan *et al.*, (2003) revealed that, a positive relationship exists between response to emergency maintenance and response time to maintenance services. This suggests that, the faster organisations respond to

their maintenance services, the more likely they would respond to emergency maintenance services. On the balance of the data presented and the findings from literature, the study concludes that, maintenance procurement strategy criteria such as the availability of maintenance tools and equipment, the quest to improve response time to maintenance, as well as the quest to improve productivity and quality of workmanship, have significant positive effect on the rate at which organisations responds to emergency maintenance services.

The study revealed that, there has been an improvement in maintenance work turnover and completion rates have been positively affected by the criteria adopted in the preparation of maintenance procurement strategy. This was evidenced by a mean response of 3.6, which means the average respondent agreed that criteria considered in preparing the maintenance procurement strategy positively impact maintenance work turnover and completion rates. The correlation coefficients presented in **APPENDIX A** shows that, criteria such as statutory requirements (0.8022), personnel issues (0.559), ability to control maintenance workers (1.00), and cost savings (0.943) all with p-values less than 0.05. The results suggest that, 100% of the improvement in maintenance work turnover and completion rates could be explained by the organisations' ability handle personnel grievances. Also 55.9% of the improvement in maintenance work turnover and completion rates, could be explained by the ability to handle personnel issues. Furthermore, 94.3% and 80.22% of the improvement in maintenance work turnover and completion rates could be explained by the quest to reduce cost and, meeting statutory requirements respectively.

The study found out that, the criteria adopted in the preparation of the maintenance procurement strategy had little effect on ensuring the continuity in the execution of maintenance services, and the extent of competitiveness achieved by the organisations in the performance of their core functions. These were evidenced by a mean response of 3.40, which meant, the average respondent was neutral (unconvinced) or had little information to suggest that, the criteria adopted in the preparation of the maintenance procurement strategy positively affected the execution of maintenance services. This notwithstanding, the study found from a positive correlation of criteria such as cost savings (0.986), personnel Issues (0.839), ability to control maintenance workers (0.875), turnover and quality of workmanship (0.612), and statutory restrictions (0.535) the continuity in maintenance services execution, and the competitiveness achieved in attending to core functions. The data suggests that, 98.6% of the improvement in continuity in the execution of maintenance services, and the extent of competitiveness achieved could be explained by the desire of the organisations to save cost. This suggests that, organisations are able focus more on their core mandate, when they are able to save money from maintenance services. This finding is further explained by Issahaku (2013) who observed that, maintenance constitutes an expense in the balance sheet of organisations, and therefore ensuring efficiency in the execution of maintenance services saves money for organisations, who in turn injects it into their core operations to increase business turnover. This means the savings in cost made from maintenance services help organisations in running their day-day-affairs.

A correlation coefficient of 0.839 for personnel issues also suggests that, 83.9% of the improvement in continuity and competitiveness in performing core functions is explained by the ability to handle maintenance staff grievances. This suggests that, organisations that consider personnel issues in the preparation of their maintenance procurement strategy are able ensure continuity in executing their maintenance services, and thus helping them to be more competitive as observed by Lee and Scot (2008).

The data further reveals a correlation coefficient of 0.875 for ability to control maintenance workers and continuity in the execution of maintenance services, and the extent of competitiveness achieved. This also suggests that, 87.5% of the improvement in continuity in the execution of maintenance services, and the extent of competitiveness achieved could be explained by the ability to control maintenance workers. Once again, the study of Lee and Scot (2008) discovered that, once an organisation has a good control its staff, usually those that come from within, it is fairly easy to ensure continuity in maintenance services delivery. Atkins (2009) further stated that, negative criteria such as staff laziness could be prevented when maintenance managers are able to

exert full control of their staff. Based on the evidence of data and the supporting literature, the study concludes that, maintenance managers' control over maintenance staff result in continuity in maintenance services provision, hence helping organisations to achieve their core mandate.

5.0 Conclusion

From the analysis of the data presented, the study concludes that, public universities within Ashanti Region in most cases adopt the Hybrid Approach of maintenance services delivery. This however worked within an outsource to in-house staff ratio of 1:4. Thus less outsource staff are used in the Hybrid Model compared to the in-house staff. This approach is advantageous to public universities in that they have access to the expert knowledge from an outside organisation which adds to the in-house team as observed by (Lind and Muyingo, 2011). This notwithstanding, the approach requires a high degree of cooperation between the in-house and outsource staff in order to attain the needed results (Hasanien and Lookeset, 2002). The study further revealed that, criteria such as the need to focus on core business; staffing flexibility, expertise and work quality; ability to control maintenance workers were influential in the preparation of the maintenance procurement strategy of the Universities. The study further revealed that, the criteria considered in the preparation of the maintenance procurement strategy had improved access to labour, the quality and reliability of maintenance services, improved response to emergency maintenance in the organisation, and work turnover and completion rates have been positively affected by the maintenance staff strategy.

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APPENDIX A CORRELATION ANALYSIS

		Improved response to emergency maintenance	Improved the quality and reliability of maintenance services	Access to labour has improved	Maintenance work turnover and completion rates have been positively affected	Improved continuity in the execution of maintenance services	The organisation has become more competitive in its core functions
Cost savings	Pearson Correlation	0.21	0.086	0.271	.943**	.986**	.986**
	Sig. (2-tailed)	0.226	0.624	0.115	0	0	0
Staffing flexibility, expertise and work quality	Pearson Correlation	-0.035	-0.086	0	.343*	0.3	0.3
	Sig. (2-tailed)	0.842	0.624	1	0.044	0.08	0.08
The Desire to Focus on Core Business	Pearson Correlation	0.315	.343*	0.271	-0.086	0.086	0.086
	Sig. (2-tailed)	0.065	0.044	0.115	0.624	0.624	0.624
Personnel Issues	Pearson Correlation	.456**	.559**	.707**	.559**	.839**	.839**
	Sig. (2-tailed)	0.006	0	0	0	0	0
Availability of Tools, Equipment and Technology	Pearson Correlation	.612**	.875**	.791**	-.375*	0.062	0.062
	Sig. (2-tailed)	0	0	0	0.026	0.721	0.721
Ability to control maintenance workers	Pearson Correlation	-0.102	-0.25	0	1.000**	.875**	.875**
	Sig. (2-tailed)	0.56	0.147	1	0	0	0
	N	35	35	35	35	35	35

Staff Turnover and quality of workmanship	Pearson Correlation	.583**	.408*	0	.408*	.612**	.612**
	Sig. (2-tailed)	0	0.015	1	0.015	0	0
Response Time to Maintenance services	Pearson Correlation	.919**	1.000**	.791**	-0.25	0.25	0.25
	Sig. (2-tailed)	0	0	0	0.147	0.147	0.147
Statutory Restrictions	Pearson Correlation	-.491**	-.535**	-.423*	.802**	.535**	.535**
	Sig. (2-tailed)	0.003	0.001	0.011	0	0.001	0.001
**. Correlation is significant at the 0.01 level (2-tailed).							
*. Correlation is significant at the 0.05 level (2-tailed).							

