

# An Examination Of Critical Success Factors (CSFS) And Key Performance Indicators (KPIs) For In-House Facilities Management In Public Polytechnics In Ghana

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*Abstract: Critical Success Factors (CSFs) and Key Performance Indicators (KPIs) are paramount to facilities management, be it in-house or outsourced. CSFs and KPIs together with the Service Level Agreements (SLAs) set the standards for which FM services should be delivered. Most public polytechnics in Ghana adopt in-house approach as the scale of outsourcing is limited. To ensure service quality and best value, in-house FM of public polytechnics needs robust CSF developed within the context of their strategic business plans and space strategy. This paper examines the CSFs and KPIs for in-house facilities management services in five public polytechnics in southern Ghana to ascertain if same is enhancing service quality. Using purposive sampling, fifty (50) staff in charge of FM related positions were selected for the questionnaire survey; thirty-six (36) were realized. In addition, twelve (12) key informant interviews were also conducted. The study adopts both quantitative and qualitative data analysis focusing on descriptive statistics and content analysis. Satisfied users was the highest ranked CSF, while risk allocation was the least. Prominent amongst the KPIs were recurrent and capital expenditure, user satisfaction index, learning environment and its impact on Teaching Learning & Research (TLR) and building condition/performance index. The paper recommends review of the performance measures, benchmarking of the in-house FM with best-in-class and the application of other performance measurement tools (balance score card and post occupancy evaluation) alongside the CSFs and KPIs.*

*Keywords: Critical Success Factors, Key Performance Indicators, Service Quality, Facilities Management, Public Polytechnics, Ghana.*

## I. INTRODUCTION

Hutchinson (2003) argues that learning environment affects Teaching, Learning and Research (TLR). The state of the facilities in the learning environment influences TLR and impact on academic performance. Empirically, several studies have established the relationship between the quality of educational facilities and resultant educational achievement (Uline & Tschannen-Moran, 2008; Tanner, 2009; Duyar, 2010; Fram, 2010). An improved physical environment may provide a positive social atmosphere with positive effects on

learning (Young et al., 2003; Olson & Kellum, 2003; Brooks-Pilling & Wright, 2005 as cited in Lavy, Garcia & Dixit, 2014). Olson and Kellum (2003) emphasize the importance of sustainable school buildings with improved environmental aspects. The question is; how best can we measure this needed improved environmental aspects towards TLR? Atkin and Brooks (2003), argued that Critical Success Factors (CSFs) and Key Performance Indicators (KPIs) are needed to monitor service delivery to achieve the desired service quality. Service Levels Agreements (SLAs) together with CSFs and KPIs are vital in achieving the desired quality of service, as they set the

minimum standard of service that is acceptable if the customer's requirements are to be met. They also provide a benchmark against which the standard of service delivered to the customer can be assessed (Atkin & Brooks, 2003). The approach to facilities management in any organization can be either in-housed or outsourced. Irrespective of which approach an organization adopts, CSFs and KPIs are needed to check the targeted results. In recent times, most organizations have outsourced several facets of FM services with the hope of reducing cost and ensuring quality service (Amarantauga & Baldy, 2003; Atkin & Brooks, 2003; Lord et al, 2007). This notwithstanding, public polytechnics in Ghana adopts in-house FM delivery, which has been largely criticized. In-house FM has been criticized for complacencies, and delivery of poor service, misleading information for decision making, failure to consider the requirements of the organization and strategy, short-term thinking and sub optimization, provision of misleading information for cost allocation and control of investments, furnishing of abstract information to employees and paying little attention to the business environment (Amarantauga & Baldy, 2003). Connors (2003) opines that in-house FM is a drawback to the benefits relating to cost, quality, motivation, flexibility and expertise skills for the core business. Amos and Gadzekpo (2016) established that quality of service by in-house FM was poor. Low remuneration, laxity at work and complacency were cited as possible causes. The general notion has been that in-house FM service delivery is poor. Undoubtedly, the rising cost of facilities services to higher academic institutions, has called for the need to improve service efficiency (Varcoe, 1996). In Ghana, rapid inflation resulting in higher prices generally has ameliorated the situation. Inflation on average has been over 17% for the past three years (Ghana Statistical Service, 2016).

Several scholarly articles have advanced the relevance of CSFs and KPIs towards the delivery of quality service. Atkin and Brooks (2003) opine that CSFs and KPIs help an organization to achieve its objectives satisfactorily. Rockart (1992); Boynton and Zmud (2008) views CSFs as core in achieving highest performance and as criteria for success (Toor & Ogunlana, 2010). Cable and Davis (2004) assert that KPIs help senior management to make strategic decisions which invariably enhances service delivery and quality. Collin (2002) views KPIs as core to performance measurement for FM services. The pertinent issue is; can CSFs and KPIs help improve in-house FM service delivery at public polytechnics of Ghana? In order to carry out these investigations, this paper intercepts the opportunity to; examine the CSFs and KPIs for in-house FM of public polytechnics in Ghana. The paper is presented in five sections. Section 1 highlights the background to the study. Section 2 provides review of related literature from past studies on CSFs and KPIs as a way of putting the study into perspective. The methodology used for this research is presented in Section 3. Results, analysis and discussion of findings are presented in Section 4. Finally conclusions, recommendation and areas of future research are proposed in Section 5.

## A. ORIGINALITY AND SIGNIFICANCE OF THE STUDY

Although facilities management is relatively young in Ghana compared to traditional real estate management, however, the practice of FM is inherent in most organizations. The field shows a study growth. There is paucity of research in the area of facilities management in Ghana and this paper presents the first ever study on CSFs and KPIs in public polytechnics in Ghana. Results and recommendations will contribute to existing literature and can also be used in academic capacity to study the growth and trend of development of FM. Other parastatal institutions can also benefit from the recommendations from the study to improve upon their FM practices.

## II. THE CONCEPT OF FACILITIES MANAGEMENT

The development of FM has been robust amidst difficulties in agreeing to a common definition. The term FM has been given different definitions by several authors. Barrett (1995) defines FM as an integrated approach to operating, maintaining, improving and adapting the buildings and infrastructure of an organization in order to create an environment that strongly supports the primary objectives of that organization. Barrett, view FM as business infrastructure management. According to Becker (1990), FM is responsible for co-coordinating all efforts related to planning, designing and managing buildings and their systems, equipment and furniture to enhance the organization's ability to compete successfully in a rapidly changing world. The International Facilities Management Association (IFMA), describe a facility manager as one involved in coordinating all the details related to planning, designing and managing facilities including systems, equipment and furniture. A facility manager is a jack of all trades, juggler of many duties, a wearer of many hats and he/she must understand the principles of business administration, architecture, engineering and human behavior (IFMA, 2010). The primary function of FM is to handle and manage support services to meet the needs of the organization, its core operations and employees (Chitopanich, 2004). According to Asiabaka (2008), educational FM is the application of scientific methods in the overall management of the physical environment of learning for the actualization of the educational goals and objectives. Lavy (2008) also establishes that structured and organized FM has the potential to improve the physical performance and appearance of a building and its system, as well as increase the users' level of satisfaction, and to improve efficiency. Facilities Management thus has the ultimate responsibility of creating the optimal environment for the organization's primary functions, taking an integrated view of the business infrastructure, and using this to deliver customer satisfaction and best value through support for and enhancement of the core business (Atkin, 2003). Although FM is relatively young as compared to traditional real estate management, it is increasingly gaining significant relevance in Ghana and for that matter other developing countries. The development of FM in Africa has been seen mainly in Nigeria, South Africa and Ghana, with all

having local chapters of IFMA (Adewunmi et al., 2009; IFMA, 2010). The relevance of FM to modern day businesses cannot be underestimated as organizations have recognized the contribution of FM to their core business. FM now offers various diverse supports for the core business. The practice has grown from what was traditionally perceived to be the mere managing of buildings or maintenance unit of an organization to the holistic reality of being woven into the core and support services of organizations (Price & Pitt, 2011). FM now cover a wide range of support services for the core business including real estate management, financial management, change management, human resources management, health and safety and contract management. In addition, it includes building maintenance, domestic services (such as cleaning and catering) and utilities supplies (Atkin and Brooks, 2003). Facilities Management places the non-core business at the service of the core business in such a way as to protect an organization's capital investment in real estate and helps turn a cost item into one of added value (Atkin, 2003a).

#### A. CRITICAL SUCCESS FACTORS FOR FACILITIES MANAGEMENT

CSFs and KPIs are vital criteria for measuring FM performance or fulfillment of a Service Level Agreement (SLA) which set forth the minimum acceptable standard of service required by the customer. Critical Success Factors (CSFs) are those actions that must be performed well in order for the goals or objectives established by an organization to be met satisfactorily (Atkin & Brooks, 2003). Rockart (1982) defines CSFs as those few key areas of activity in which favorable results are absolutely necessary for a particular manager to reach his or her goals. Boynton and Zmud (2008) defines CSFs as those few things that must go well to ensure success for a manager and an organization, and therefore, they represent those managerial or enterprise areas that must be given special and continual attention to bring about high performance. The CSFs works hand-in-hand with the SLAs and has to correspond to the goals and objectives that are aligned to the organization's business strategy. Without this alignment, successful attainment of service levels may contribute nothing to the success of the core business (Atkin & Brooks, 2003). In the attainment of the organizations overall goals, CSFs are the factors that must be achieved. They may be derived from the features of a particular organization's internal environment. These include its products, processes, people, and possibly structures, and are a reflection of an organization's specific core capabilities and competencies critical for competitive advantage (Duchessi, Schaninger, & Hobbs, 1989). Further, to identify the CSFs in an organization, it is necessary to understand the organization itself, since the factors may differ regarding the type of organization, and its ownership thus either private or public.

Hartini, Arthur and Mohamed (2007), identifies change management, management competency and support, system structure, project planning and management, and information technology, infrastructure teamwork and quality, culture, quality management system and satisfactory rewards, less bureaucratic and participative, information technology/information system, and adequate financial

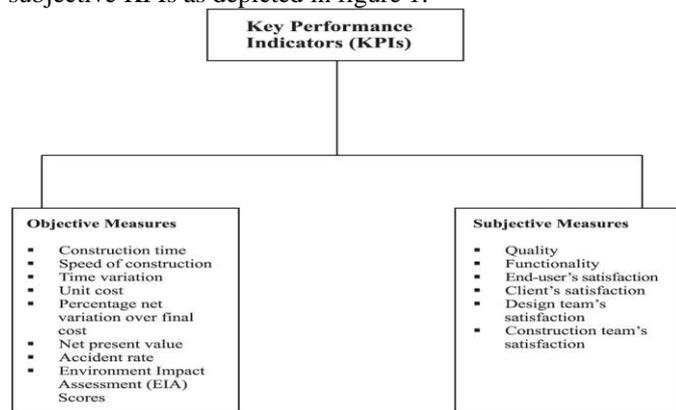
resources as CSFs for business process reengineering for higher education. Peppard and Fitzgerald (1997) identifies ambitious objectives, the deployment of a creative team in problem solving, and a process approach and integration of electronic data processing (EDP) as CSFs. Ascari, Rock, and Dutta (1995) have discussed four other elements leading to successful business process reengineering (BPR): culture, processes; structure; and technology. In examining critical success factors for the construction sector, Sanvido et al., (1992) found four CSFs; a well-organized and cohesive facility team, a series of contracts allowing to encourage the various specialists to behave as a team without conflicts and to allocate risk and reward correctly, experience in various aspects of similar facilities; and timely, valuable optimization information from related parties in the planning and design phases. Despite this comprehensive list of CSFs in various disciplines, the question is whether these are the only salient CSFs for FM? Further, can these CSFs identified hold for all economies of the globe, especially the developing economies like Ghana? Babatunde, Opawole and Akinsiku, (2012), identified nine CSFs for public private partnership projects in Nigeria. This comprehensive list includes; competitive procurement process, thorough and realistic assessment of the cost and benefits, favorable framework, appropriate risk allocation and risk sharing, government involvement by providing a guarantee, political support, stable macroeconomic condition, sound economic policy and availability of suitable financial market. Ofori-Kuragu, Baiden, and Badu, (2012) using factor analysis identified eight set of CSFs for the Ghanaian contractors. The study was geared towards developing a set of CSFs to improving best practices for Ghanaian contractors towards international competition. Amongst the variables identified were quality and zero defects culture, organizational design, work culture and work environment, client satisfaction, strategy; leadership; measurement, analysis of information and knowledge management, and implementation of lean principles. The studies touched on above seem to suggest that depending on the organizations objectives and the particular activities concerned for the organization, several success factors could emerge. The overall objective is centered on the attainment of service levels that will contribute to the success of the core business.

#### B. KEY PERFORMANCE INDICATORS (KPIs) FOR FACILITIES MANAGEMENT

KPIs are set alongside CSFs to primarily monitor their achievements. Within each CSF will be one or more KPIs. The purpose of KPIs is to enable management to understand, measure and control progress in each of the CSFs (Atkin & Brooks, 2003). Toor and Ogunlana (2010) considered factors constituting the success criteria as KPIs. KPIs are helpful to compare the actual and estimate performance in terms of effectiveness, efficiency and quality of both workmanship and product. Choosing the right KPIs is reliant upon having a good understanding of what is important to the organization. Several performance measurement tools exists for FM. Prominent amongst them are benchmarking, balanced scorecard approach and post occupancy evaluation. Cable and

Davis (2004) assert that performance measurement using established KPIs helps the senior management team to make strategic decisions. The selection of measures of performance as KPIs depends on who actually uses the performance assessment. Critical consideration is given to the level of managerial position, the public or private nature of the organization, the assessment objectives (financial, functional, or physical), and prevailing trends in the industry (Amaratunga et al., 2000b; Cripps, 1998; Cable and Davis, 2004; Eagan and Joeres, 1997; Hinks, 2004 Lebas, 1995). Further the development of KPIs requires robust skills and expertise to avoid much ambiguities and repetitions. Collins (2002) outlines six (6) criteria as a guide in the development of KPIs generally. Amongst them are; limiting the number of KPIs to include only relevant indicators, versatile indicators, ease of comprehension and interpretation by the user organization, ease of accessibility and room to update the set KPIs.

Chan and Chan (2004) in developing KPIs for construction success grouped KPIs into objective and subjective KPIs as depicted in figure 1.



Source: Chan and Chan (2004)

Figure 1: KPIs geared towards construction success

According to Chan and Chan (2004), the time elements of the subjective KPIs deals with construction time, speed, and time variation for the projects (start and finish). The cost elements covers the units cost, and the percentage net or the variation in cost. The net present value deals with project turn over, basically a measure of the profitability of the project, expressed in terms of the expected cash flows. Other objective KPIs were accident rate that deals with health and safety, and environmental impact assessment due to the rising concern of the environmental issues to the construction industry. The subjective measures as indicated includes quality which deals with the features of the project to satisfy a particular need, functionality, and satisfaction for stakeholders involved in the project. These include the client, design team, end user and the construction team. Enshassi and Shorafa (2015) identified Building Performance Indicators (BPIs), Maintenance Efficiency Indicators (MEI), Annual Maintenance Expenditure (AME) and Urgent Request Indicator (URI) as KPIs for maintenance of public hospitals in Gaza strip. Lavy, Garcia and Dixit (2010) present a literature-based list of categorized KPIs that covers the assessment of facility performance, breaking down the KPIs into four major categories: financial, functional physical, and user satisfaction. The financial indicator primarily deals with cost related expenses. These

include recurrent and capital expenditure items. Other indicators are replacement value, maintenance efficiency index, facility condition index and churn rate and associated cost.

The functional indicators deal with parameters that directly related to the functionality of the facilities. These indicate the ability of the facility to serve its primary function. Other indicators captured are the building performance index, resource consumption, waste, security, health and safety and indoor environment quality. Accessibility by the disabled is captured under this category of KPIs. The physical categories of KPIs deal with how the built environment supports the core objective of the organization. The relation between the physical environment, productivity and employees are addressed. The user satisfaction category holistically views the satisfaction of the general stakeholders of the organization. Customers, building occupants, and the organization at large interest are all considered. Table 1 provides a summary of the four indicators.

FINANCIAL	FUNCTIONAL	PHYSICAL	USER SATISFACTION
Operating costs	Building physical condition – Qualitative	Productivity	Customer/building
Occupancy costs	Building physical condition – Quantitative	Parking	Occupants' satisfaction with products or services
Utility costs	Building performance index (BPI)	Space utilization	Community satisfaction and participation
Capital costs	Building maintenance cost	Employee or occupant's turnover rate	Learning environment, educational suitability, and appropriateness of facility for its function Appearance
Grounds-keeping cost	Resource consumption – energy; water;	Mission and vision, and dependency index (MDI)	
Custodial and janitorial cost	Materials	Adequacy of space	
Current replacement value (CRV)	Property and real estate Waste		
Deferred maintenance, and deferred maintenance backlog	Health and safety Indoor environmental quality (IEQ)		
Capital renewal	Accessibility for Disabled		
Maintenance efficiency indicators (MEI)	Security		
Facility condition index (FCI)	Site and location		
Churn rate and churn costs			

Source: Lavy, Garcia and Dixit (2010)

Table 1: List and Categorization of KPIs

Several CSFs and KPIs have emerged from literature from various scholars and disciplines. The question is which CSFs and KPIs best suits public private polytechnics of Ghana? Especially where their current FM practice of in house service delivery is heavily criticized. Unarguably this

provides a great opportunity to build literature on CSFs and KPIs in Ghana especially for educational FM.

### III. RESEARCH METHODOLOGY

The study adopts a multiple case study survey of five polytechnics in southern Ghana. Stake (1995), views the art of case study as very vital in social science research. Yin (1994) also views case study as a research strategy, which focuses more on the research question and what one intends to do. A case study research allows the researcher to focus more specifically on the research question and area. The overall objective is to have logic between the data to be collected and the conclusions to be made.

#### A. STUDY AREA AND SAMPLE POPULATION

Five public polytechnics in southern Ghana were adopted for the study. These were Kumasi, Accra, Takoradi, Koforidua and Cape Coast polytechnics. These five polytechnics were selected for the study because they are premier polytechnics in Ghana with well-built infrastructure and population of over 7,500 each making them suitable for the study. Conceptualizing the broader definition of facilities management by IFMA (2010) and Lavy, Garcia and Dixit (2010) and KPIs framework for facilities performance assessment, the study considered purposively persons in capacities exhibiting functions of a facility manager as key respondents. These included real estate officers, architects, quantity surveyors, maintenance engineers, planning officers, procurement officers and heads of various domestic activities (cleaning, catering and transport). These respondents work in various departments of the polytechnics municipal and works department, estate and facilities management department, procurement unit, engineering and maintenance, planning units, domestic services units, parks and gardens, power, physical planning and development department of the polytechnics.

#### B. DATA COLLECTION

Using purposive sampling, a total of 50 copies of questionnaire were distributed, and 36 were retrieved. The data were collected through questionnaires administered on members of staff in charge of FM related duties. A covering letter explaining the rationale of the research and terminologies involved were attached. Further to validate the responses from the questionnaire survey, 12 key informants knowledgeable in educational FM within the polytechnics were also purposively interviewed. This was done by arranging for appointments for the interviews through the phone. Most of the interview section lasted for not more than 45 minutes at the convenience of the respondents' offices. The use of purposive sampling is to afford the researcher the leverage to select the most productive sample that possess the experience and expertise to provide quality information and valuable insights needed to answer the research question (Fellows and Liu, 2008; Denscombe, 2010). A period of four weeks in November, 2015 was used for the data collection. A

mob up period of 2 weeks was used to gather the remainder of the questionnaire after the initial four weeks. This helped minimized the non-response rate. The response rate for the questionnaire survey and interview was 77.42% which was considered as very adequate for the analysis.

#### C. DESIGN OF QUESTIONNAIRE AND INTERVIEW GUIDE

There is paucity of research on facilities management in Ghana, especially on CSFs and KPIs for higher education. Conspicuously the review of literature was limited on higher educational institutions as there is virtually little research on that area. Most studies have been on construction, maintenance, business process reengineering (BPR) and other physical developmental related disciplines. After carefully fine-tuning these success factors to suit the study herein, and pretesting the draft questionnaire with experience FM practitioners and academicians, 9 key variables were selected as critical success factors for polytechnics FM. One important benefit from the pretesting of the questionnaire was the inclusion of factors such as satisfied users, lowest practical cost and minimum disruption, and enhanced reputation as CSF. Basically, the questionnaire was in three parts. Part A sought general demographic information about the respondent's whiles Part B of the questionnaire sought to seek the respondent view on the CSF. Part C of the questionnaire sought respondents view on the key performance indicators set to monitor these CSFs. Lavy, Garcia and Dixit (2010) list of KPIs was adopted for the part C of the questionnaire. There were however, some modifications to suit this study. Table 1 under the literature review presented a summary of the list of KPIs outlined by Lavy, Garcia and Dixit (2010).

#### D. MODIFICATION TO THE LAVY, GARCIA AND DIXIT (2010) LIST OF KPIS

##### a. FINANCIAL KPIS

For purposes of this study, all recurrent cost items on the Lavy, Garcia and Dixit (2010) were combined as general recurrent expenditure. Thus operating cost, occupancy cost, utility cost, grounds keeping cost, custodial and janitorial cost. Similarly, all capital expenses were also categorized as general capital expenditure. Facilities condition index was removed as it relates to building condition. Table 4 under the findings and discussion present the final list of indicators after the modification.

##### b. FUNCTIONAL KPIS

The building's physical condition both quantitative and qualitative was merged with the building performance indicators since the building condition invariably gives an indication to the building performance. Property and real estate as an indicator was deleted. The justification is that the research is evaluating KPIs for the built environment in general inclusive of property and real estate. Table 5 under the findings and discussion present the final list of indicators after the modification.

c. *PHYSICAL KPIS*

Productivity was expunged since the study organization herein is basically service driven. Learning environment and impact on TLR was used to replace same. Mission and vision and mission dependency index was also taken out from the list. Public polytechnics in Ghana are all middle manpower training institutions, striving to produce high caliber manpower to serve the nation; as such, the factor was deemed irrelevant in this context. Table 6 under the findings and discussion present the final list of indicators after the modification.

d. *USER SATISFACTION KPIS*

Customers or building occupant's satisfaction and community satisfaction and participation were merged as one factor under broad name user satisfaction index. Users in this context connote the general stakeholders of the polytechnics community; lecturers, students, general staff. Indexing the factor makes room for easy quantification of such a core variable. Appearance was deleted as it was deemed irrelevant for the study. Appearance, we believe have little impact on user satisfaction for educational institutions. Learning environment and educational sustainability and appropriateness of facility for it functions was deleted. The justification is that a factor "learning environment and impact on TLR was already captured under the physical indicators. Interestingly, two additional indicators; absenteeism and enhanced reputation emerged from the pretesting of the questionnaire. Undoubtedly, these are prime indicators of user satisfaction. Table 7 under the findings and discussion present the final list of indicators after the modification. To elicit the extent of significance of CSFs and KPIs, the survey respondents were asked to rate against the five-point scale, from "not significant" (1) to "extremely significant" (5).

E. DATA ANALYSIS

A qualitative and quantitative approach to data analysis was employed for the study. The main statistical software was Statistical Package for Social Science (SPSS). Descriptive statistical tools which focused on frequencies, percentages, mean, standard deviation and Relative Importance Index (RII) were used to analyze the demographical details of respondents and the CSFs. The RII was used to examine the relative ranking of perception of importance attached to the factors. The RII was a good checker because it gives a direct descriptive interpretation of the most critical factor based on the rankings with the likert scale by each respondent. These rankings made it possible to compare the relative importance of the CSFs and KPIs for the polytechnics in-house FM. Factors above 0.5 and closer to 1 were deemed as significant, while factors below 0.5 were deemed as less significant. The survey data from the interview were analyzed using open, inductive content analysis following Miles and Huberman's (1994) framework. This involved identification of Patterns and themes and their links and contributions to literature. The terms, major words and short sentences were duly noted and accordingly classified. Where necessary, the authors

constructively sub divided broader categories to capture all views expressed by the respondents taking concise notes of all possible differences and similarities.

F. SCOPE/LIMITATION

The study was limited to all five public polytechnics in southern Ghana (Kumasi, Takoradi, Koforidua, Accra and Cape Coast polytechnics). The study was limited to southern Ghana because of inadequate funding as well as travelling distances involved. Ease of accessibility to respondents was also a contributing factor.

IV. FINDINGS AND DISCUSSIONS

A. DEMOGRAPHIC DETAILS OF SURVEY RESPONDENTS

Table 2, depicts the respondent for the study. Conspicuously majority of respondents were in top and middle level managerial positions as evidenced by 54.17% and 35.42% of the respondents respectively. With regard to academic qualification majority of the respondent had either an MSC/MBA/MPhil in their various areas of specialty thus constituting 75.00%. One person had PhD. The professional affiliation of the respondents were varied due to the diverse nature of the services as well as the wide scope of FM. Majority of the respondent were members of the Ghana Institution of Surveyors(GHIS) which included estate/property/ facility managers/valuers and quantity surveyors. This constituted 47.92% of the respondent. Other professional bodies like Ghana Institute of Purchasing and Supply Chain (GIPS), IFMA, Ghana Institute of Engineers (GIE), Ghana Institute of Architects (GIA), Institute of Chartered Accountant (ICA) and Ghana Institute of Chartered Accountants (GICA) and Royal Institute of Chartered surveyors (RICS) were ranging 1% -7% of the sampled respondents. The various professionals have been practicing between 1 - 20 years. 27.08% had work experience of more than 20 years. 14.58% had 16 – 20 years of work experience, 35.42% had 11 – 15 years of experience, 14.58% had 6 -10 years of experience and 8.33% had 1 – 5 years of experience making them knowledgeable and qualified enough to be respondents for the study. The professions of the respondents were also considered. 47.92% were real estate and facilities managers which formed the majority, followed by architects which constituted 10.42%. The least represented were procurement officers, accountants and counselors with a 6.25% for each respondent category.

Variables	Polytechnics					Total (n=48)	Percentage (100%)
	Kumasi (n=14)	Takoradi (n=10)	Koforidua (n=6)	Accra (n=12)	Cape Coast (n=6)		
<b>Managerial Level</b>							
Top	8	6	4	5	3	26	54.17
Middle	3	6	2	4	2	17	35.42
Lower	1	1	1	1	1	5	10.42
Total						48	100

Academic Qualification							
PhD	1	0	0	0	0	1	2.08
MSc/MBA/MPhil	10	6	7	8	5	36	75.00
BSc/HND	2	3	2	2	3	12	22.92
Total						48	100
Professional Affiliation							
GIPS	2	1	1	1	1	6	12.50
IFMA	2	1	1	2	1	7	14.58
GhIS	7	4	3	6	3	23	47.92
RICS	0	0	0	1	0	1	2.08
GIA	1	1	1	1	1	5	10.42
GIE	1	1	0	1	0	3	6.25
ICA/GICA	1	1	1	0	0	3	6.25
Total						48	100
Years of Experience							
Over 20 years							
16-20	4	3	3	1	2	13	27.08
11-15	2	1	2	1	1	7	
6-10	3	5	4	3	2	17	35.42
1-5	0	1	1	1	1	4	8.33
Total						48	100
Profession							
Property/Facilities Managers	5	5	4	5	4	23	47.92
Quantity Surveyors	1	1	0	1	1	4	8.33
Architects	2	1	1	1	0	5	10.42
Maintenance Engineers	1	1	0	1	1	4	8.33
Planning Officers	1	1	1	0	0	3	6.25
Procurement Officers	1	1	0	0	1	3	6.25
Accountants	1	1	0	1	0	3	6.25
Counsellors	0	1	1	1	0	3	6.25
Total						48	100

Source: Field Survey (November, 2015)

Table 2: Demographic information of respondents

NOTE: MSc, Master of Science; MBA, Master of Business Administration; MPhil, Master of Philosophy; BSc, Bachelor of Science; HND, Higher National Diploma; GIPS, Ghana Institute of Purchasing and Supply Chain; IFMA, International Facilities Management Association; GhIS, Ghana Institution of Surveyors; RICS, Royal Institute of Chartered Surveyors; GIA, Ghana Institute of Architects; GIE, Ghana Institute of Engineers; ICA, Institute of Chartered Accountants; CIGA, Ghana Institute of Chartered Accountants.

## B. CRITICAL SUCCESS FACTORS FOR IN-HOUSE FM SERVICES

Table 3, present the respondent opinion on factors deemed critical to FM towards creating optimal learning environment. Generally, respondents opined CSFs as very vital in achieving service quality. Satisfied was ranked first CSF with mean value of 4.8759 (RII=0.9285). This deals with creating the congenial environment needed to enhance TL. In-house FM of public polytechnics views user satisfaction as very important. Holistically, users of the polytechnics facilities include students, lectures, and administrative staff as well as other stakeholders of the polytechnic community. This was followed by lowest practical cost with a mean value of 4.7253 (RII =0.9315). Generally, respondents were of the view that in-house is less expensive than outsourced. The cost of FM services should as much as possible be minimal. This view is in line with (Atkin & brooks, 2003) that FM support services should represent best value on the grounds of affordability for the organization in the implementation of the objectives of its strategic plan.

CODE	ITEMS	MEAN	STD	RII	RANK
V1	satisfied users	4.8759	0.4222	0.9285	1
V2	lowest practical cost	4.7253	0.6953	0.9315	2
V7	minimum disruption	4.1289	0.8536	0.8121	3
V3	effective change management	3.5252	0.7660	0.7638	4
V4	enhanced reputation	3.1635	0.6221	0.6625	5
V5	effective IT systems for FM	2.6652	0.7521	0.5972	6
V6	team working/working culture	2.1468	1.6230	0.4423	7
V9	satisfactory rewards/penalties	1.9752	0.6235	0.3225	8
V8	systematic risk allocation	1.7213	1.2351	0.2632	9

Source: Field Survey (November, 2015), STD- standard deviation, RII-relative important index

Table 3: Critical Success Factors for In-House FM

Minimum disruption was ranked 3<sup>rd</sup> mean values 4.1289(RII=0.8121). This factor deals with concerns to prevent loss of service, minimize accident rate and breakdowns to facilitate FM service delivery. Effective change management and enhanced reputation were ranked 4<sup>th</sup> and 5<sup>th</sup> respectively; giving a corresponding mean and RII as (mean=3.5252, IRR=0.7638) and (mean=3.1635, RII= 0.6625) respectively. Facilities Management deals with change management as new facets of services will be brought on board. There is the need to strategically manage users of the facilities to adapt to new facilities and services. Hartini, Arthur and Mohamed (2007), identified change management as critical for business process reengineering for higher education. Enhanced reputation was ranked 6<sup>th</sup>, mean 3.1635, RII=0.6625. These involved general activities that were done in the quest to market the polytechnics. These are usually reflecting through students enrolment numbers and international and national rankings of the polytechnics. Effective IT systems for FM was ranked 7<sup>th</sup> with mean 2.6652, RII =0.5972. The need for the application of Information Communication Technology (ICT) to enhance FM performance has been of interest to most facilities managers in

recent times. According to Atkin and Brooks (2003), information management is becoming of relevance to FM, especially in the area of building maintenance. Computer-aided facilities management (CAFM) is used to plan and manage the use of space and has proven popular; even so, it represent an intermediate technology that is likely to give way to building information modeling (BIM). ICT for FM is becoming integral part of Polytechnics; however the problem limiting the use of ICT in FM is the unavailability of software packages, especially in the area of building maintenance. The least significant CSFs was systematic risk allocation recording a mean score of 1.7213 (RII=0.2632), followed by satisfactory rewards and penalties, working culture and team working with mean = 1.9752(RII=0.3925), and mean = 2.1468(RII=0.4423) respectively. There is not much of risk control with polytechnic in-house, however much of the risk control was for the outsourced FM. Rewards and penalties are check measures to either encourage or penalized staff. Ironically, the frequency of the awards is slow, as is usually given on yearly basis. In addition, there were issues relating to funding of awards, and biasness in criteria for the selection. Penalties exist as a form of disciplinary actions, but implementation is very weak. Although earlier studies by Hartini, Arthur and Mohamed (2007); Ascari, Rock, and Dutta (1995); and Ofori-Kuragu, Baiden, and Badu (2016) have touched on the relevance of working culture and team working, respondents ranked it as a weak CSF evident by 8<sup>th</sup> position.

C. KEY PERFORMANCE INDICATORS FOR IN-HOUSE FM

Based on the modification made to Lavy, Garcia and Dixit (2010), the respondents' view on the KPIs are grouped under the four main categorization; finance, functional, physical and user satisfaction.

Source: Field Survey (November, 2015)

Table 4: Finance Related Key Performance Indicators

The main financial indicator for polytechnics was cost. This includes both recurrent and capital expenditure as evident by the 1<sup>st</sup> and 2<sup>nd</sup> rank with RIIs closer to 1 (0.9942 and 0.9251) respectively. This was followed by maintenance

CODE	ITEMS	MEAN	STD	RII	RANK
V5	General recurrent expenditure	4.8158	0.7785	0.9942	1
V1	General capital expenditure	4.7255	0.5652	0.9251	2
V2	maintenance efficiency indicator	4.6523	1.2536	0.7368	3
V3	Deferred maintenance and maintenance backlog	3.2252	0.9652	0.6112	4
V6	Current replacement value	2.6521	0.5528	0.4003	5
V4	Churn rate/churn cost	1.6653	0.8366	0.2428	6

efficiency indicators and deferred maintenance and maintenance backlog with mean and RII values of 4.6523(RII=0.7368) and 3.2252(RII=0.6012) correspondingly. The problem of maintenance has been persistent with public institutions over the years with the primary causes being funding, neglect and poor maintenance culture. This has resulted in damage and deterioration to some public buildings

which have defeated the purpose for which they were put up (Asare, 2011). Ironically, Enshassi and Shorafa (2015), identified maintenance efficiency indicator and annual maintenance expenditures as key KPIs for the management of public hospitals in Gaza Strip. The least significant factors were current replacement value and churn rate as well as cost with mean and RII values of 2.6521(RII=0.4003) and 1.6653(RII =0.2418) in that order. Replacement value deals with the cost of reconstructing a facility anew. Churn rate and cost deals more of stakeholder satisfaction.

CODE	ITEMS	MEAN	STD	RII	RANK
V5	Building condition/BPI	4.9254	0.6839	0.9248	1
V6	Resource consumption (Energy & water)	4.7524	0.7524	0.8426	2
V4	Waste	3.2564	1.7660	0.8521	3
V3	Health and safety	3.1025	1.4103	0.7235	4
V2	Indoor environmental quality (IEQ)	2.6523	0.6262	0.6526	5
V1	Security	2.3542	0.5394	0.6421	6
V7	Accessibility for disabled	1.9758	0.5874	0.4344	7
V8	Site and location	1.6533	1.2354	0.2114	8

Source: Field Survey (November, 2015)

Table 5: Functional Key Performance Indicators

The building condition/building performance index was the highest ranked KPI with a mean value of 4.9254 and RII value of 0.9248. This basically deals with the general conditions of the built environment to support the primary function of teaching, learning and research. An indicator of growing concern to the polytechnics is resource consumption especially electricity. This indicator was ranked 2<sup>nd</sup> with a mean of 4.7524 and RII=0.8426. Ghana currently has challenges in the energy sector. There is erratic power supply amidst electricity tariffs adjustment. Electricity and water tariffs have seen an increment over a 100% over the past two years (Sapri et al, 2016). The resource consumption indicator of the built environment is therefore of paramount interest to managers of educational facilities in Ghana. Waste generation goes with resource consumption and this was ranked 4<sup>th</sup> with a mean of 3.2564(RII=0.8521). Health and safety and indoor environmental quality was ranked 5 and 6<sup>th</sup> with mean and RII values of 3.1025(RII=0.7235) and 2.6523 (RII =0.6526). Security was ranked 7<sup>th</sup> with a mean value of 2.3542 (RII=0.6421). Amos and Gadzekpo (2016) had cited security as one the reasons why FM services were kept in-house. Polytechnics as an institution of higher learning and research, views issues of security as pivotal to its managers and users. The likelihood of an external service provider having access to some salient and vital information as well as theft issues is of greater concern to public polytechnics. The least significant factors were site selection and location and this was followed by accessibility for the disabled with mean values of 1.6533(RII=0.2114) and 1.9758(RII=0.4344) respectively. The researchers found as unfortunate that issues of disability accessibility is not granted the utmost attention. It was observed that most of the facilities developed earlier failed to duly consider disability concerns. It is worth mentioning that this goes contrary to the Persons with Disability Act (Act

715). New structures are however, given concerns to disability accessibility.

CODE	ITEMS	MEAN	STD	RII	RANK
V1	Learning environment and impact on TLR	4.8252	1.2358	0.9157	1
V2	employee turnover rate	4.7051	0.6524	0.9011	2
V3	Space utilization	3.5289	0.4587	0.8285	3
V5	adequacy of space	2.6158	0.8542	0.4462	4
V4	Parking	1.9223	0.4545	0.3758	5

Source: Field Survey (November, 2015)

Table 6: Physical Key Performance Indicators

Out of the five indicators, learning environment and its impacts on TLR was ranked as 1<sup>st</sup> with a mean value of 4.8252 (RII=0.9157). Schneider (2002) asserts that learning environments could impact student performance. Managers of polytechnic facilities thus view the factor as very significant. Employee turnover rate ranked 2<sup>nd</sup> with a mean of 4.7051 (RII=0.9011). This typically relates to how the physical environment influences the general polytechnic staff attendance to work. Undoubtedly, good work environment with all the needed amenities and services will increase the employee turnover rate. Space utilization ranked 3<sup>rd</sup> with a mean of 3.5289 (RII=0.8252). With land being a fixed factor, the need to judiciously utilize the current space was of prime interest to the facilities managers. The least significant factor was parking and this was followed by adequacy of space with mean and RII values of 2.6158 (RII=0.4462) and 1.9223 (RII=0.3758) respectively.

CODE	ITEMS	MEAN	STD	RII	RANK
V3	user satisfaction index	4.8652	0.5285	0.9952	1
V2	Absenteeism	3.3245	0.3654	0.7524	2
V1	enhanced reputations/Institutional ratings	1.7541	1.5321	0.4526	3

Source: Field Survey (November, 2015)

Table 7: User Satisfaction Key Performance Indicators

User satisfaction index was ranked 1<sup>st</sup> with mean of 4.8652 (RII=0.9952). The research revealed that the main index for measuring user satisfaction is the number of complaints from various stakeholders of the polytechnic community. Absenteeism was ranked 2<sup>nd</sup> with a mean of 3.3245 (RII=0.7525). The views of the respondent is in line with findings that facility performance could result in an increased or decreased number of absenteeism cases, which might impact on the performance of the entire school (Brooks-Pilling & Wright, 2005 as cited in Lavy, Garcia & Dixit, 2014; Olson & Kellum, 2003; Schneider, 2002; Young et al., 2003). Enhanced reputation /institutional ratings was the least with mean of 1.7541 (RII=0.4526). This indicator relates to student applications, awards for excellence which may also lead to external demand for the polytechnic facilities. This can increase the internally generated funds for the polytechnics.

## D. DISCUSSION

The CSFs and KPIs ranked by the respondents largely fit into the context of those identified in extant literature. Most CSFs in various scholarly articles such as user satisfaction, cost, and change management, IT systems for FM, culture and team working were all duly captured by the study. The Lavy, Garcia and Dixit (2010) list of KPIs under the four broad categories of finance, functional, physical and user satisfaction largely suit the study. However, there were some peculiarities. A finding of peculiar interest under customer satisfaction was absenteeism. Although user satisfaction index was ranked high, the criterion for measuring satisfaction was not clear. Amos and Gadzekpo (2016) suggested a thorough survey to determine what constitute customer satisfaction. Conspicuously, the finance indicators dealt with general recurrent and capital expenditure and maintenance, while the functional indicators dealt more with the building condition and its functionality. Two key functional indicators of interest were resource consumption and accessibility for the disabled. The built environment consumes about 40% of the world's energy (Price, Pitt, & Tucker, 2011). With the rising cost of utility bills and current energy challenges, the development of terotechnology ideas, which considers the life cycle cost of the built environment, could be a path in the right direction. We found it disappointing, the low rank for accessibility by the disabled indicator. The high rank for the physical environment and its impact on teaching learning and research confirms the positive relationship between learning environment and academic performance. The comprehensive list of CSFs and KPIs captured for the analysis demonstrates a wider applicability, and a holistic approach to the performance evaluation by in-house FM of the study polytechnics (Amaratunga & Baldry, 2003; Gumbus, 2005; Hinks & McNay, 1999; Shohet, 2006).

## V. CONCLUSION AND RECOMMENDATIONS

This paper has established that CSFs and KPIs are vital performance measurement tools for in-house FM of public polytechnics in enhancing service delivery and quality. This is evidenced by the fact that more than 60% of the KPIs and CSFs have  $RII \geq 0.5$  indicating them as significant. This notwithstanding there is the need to develop more quantifiable or measurable CSFs and KPIs. This is key to calibrating the effectiveness of a built facility in a comprehensive manner (Kincaid, 1994). Facilities managers should thus develop performance indexes. CSFs and KPIs must be reviewed with reference to past, present functioning and the future geared toward the organization's goals (Amaratunga, Baldry, & Sarshar, 2000b; Cable & Davis, Douglas, 1996 2004; Lebas, 1995). This will provide the needed direction to management for decision-making (Barret & Baldry, 2003; Kincaid, 1994). There is also the need for in-house FM team to benchmark performance with external best-in-class organization. Other performance measurement systems such as balance scorecard and post occupancy evaluation must be instituted alongside the CSFs and KPIs. This will help improve in-house FM. This paper examined the CSFs and KPIs for in-house FM in

polytechnics in Ghana. Future research will be required to establish empirically, the relationship between the CSFs and the KPIs and the extent to which they influence overall performance.

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