

Facility Management and Maintenance: A Case Study in Health Care

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Abstract - Healthcare is an ever-changing industry and signs show that this will most likely be the case for many years to come. In order to have healthcare, companies must have facilities in which to provide said care. This paper will focus on those facilities and what it takes to keep them operating at an optimum state. Facilities management is a quite broad topic when looking at any industry but when it comes to the facilities required to provide patient care the spectrum is mind boggling. Healthcare facilities must have people to maintain them. These people are required to be knowledgeable in many areas including but not limited to maintenance and construction activities. Employees in the facilities management field are required to be trained in many fields including electrical, mechanical, plumbing, HVAC, and a host of other specialized areas. This paper will elaborate on the detailed training that facilities employees must complete in order to keep up with changes in the field.

Keywords - facilities Management; Digitalization; Performance Measurement; Sustainability.

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INTRODUCTION

Hospitals are complex and technologically advanced, with many complicated structures and sub-functions. The health-care facilities management (FM) is different from other sectors, as they serve the clinical employees, the patients as well as the visitors of the hospital. The clinical employees are recognized as the expertise of producing health-care services and the health-care FM is one of the key elements for a successful delivery of health-care services. Performance evaluation is essential for ensuring the effective operation of facilities and is particularly relevant for improvement measures. Finding relevant key performance indicators (KPI's) are debated among the researcher and are reported relevant for monitoring and assessing the quality of the FM services. looked at how performance measurements are practiced as a tool for informing decisions at a strategic level in four English speaking countries. They found that performance measurement tools are adopted by governments where the health-care property competencies are centralized. However, as mentioned by several researchers, relevant KPI's at the operative level are about not only technical measures relevant for the maintenance planning and predicting annual operational costs but also service measures as well like responsiveness, professionalism and competence.

LITRATURE REVIEW

IgalShohet and Sarel Lavvy (2017):

Contemporary trends in healthcare services provision tend toward the increased use of community-based healthcare centers. This study on the concepts of healthcare provision hypothesizes that in the future, the main source of healthcare services will be a network of community-based clinics which will be responsible for the majority of primary and ambulatory care. This concept implies that a network of community clinics equipped with state-of-the-art telemedicine will be established with a wide geographical dispersion. The implications for healthcare facilities in terms of the resources and performance of the built environment are investigated by reference to the Israeli healthcare system. This paper reflects the results of research on healthcare facility management over the past 10 years. Comparison of the performance and maintenance of hospital facilities and community clinics reveals that the maintenance and performance of clinic facilities have the potential to combine improved healthcare facility services with cost-effective facility management and maintenance.

Harold Lucas (2017): Healthcare is an ever-changing industry and signs show that this will most likely be the case for many years to come. In order to have healthcare, companies must have facilities in which to provide said care. This paper will focus on those facilities and what it takes to

keep them operating at an optimum state. Facilities management is a quite broad topic when looking at any industry but when it comes to the facilities required to provide patient care the spectrum is mind boggling. Healthcare facilities must have people to maintain them. These people are required to be knowledgeable in many areas including but not limited to maintenance and construction activities. Employees in the facilities management field are required to be trained in many fields including electrical, mechanical, plumbing, HVAC, and a host of other specialized areas. This paper will elaborate on the detailed training that facilities employees must complete in order to keep up with changes in the field

METHODOLOGY

I've touched briefly on the maintenance of facilities but maintenance is just a small part of healthcare facilities management. Of course, maintaining the facility is extremely important but managing that facility goes much deeper. When talking about managing a facility we look at the whole operation from the utilities entering the building to a happy customer going home well. All parts of the operation of a facility must work in unison and everyone involved must be on the same page. Facility engineers work with physicians, nurses, administrators, accountants and a host of other people to ensure that the facility as a whole is meeting everyone's needs. Each person or department in a hospital or healthcare setting has specific needs that must be met in some way or another by the facility team. It would sometimes seem that a healthcare facility is a living organism. It does provide life in ways that most people wouldn't think about. For instance, there are machines within a facility that make medical air that supplies patient ventilators that breath for a patient that is unable to breath on their own. This air is piped throughout the facility and connected to outlets in strategic locations. Large tanks that hold liquid oxygen are onsite to supply oxygen throughout the facility much like the medical air. Another utility is called medical vacuum. Large vacuum pumps provide piped vacuum throughout the facility to ensure that any patient requiring vacuum will have virtually an endless supply. These are life sustaining utilities that must be maintained constantly to ensure seamless availability 24 hour per day 7 days perweek.

ANALYSIS

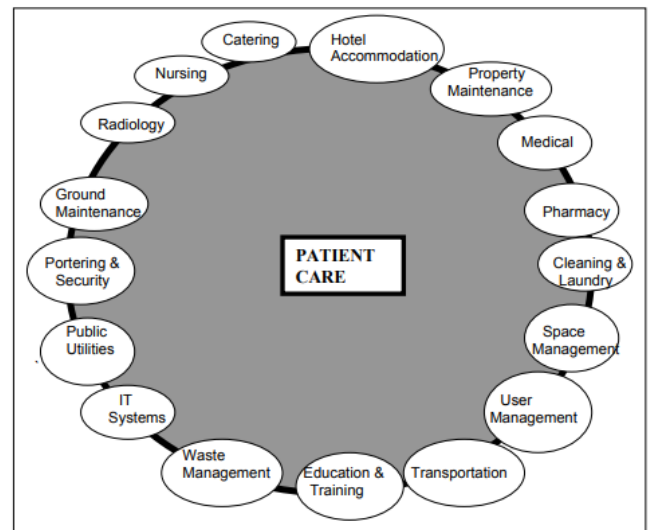


Figure 1: Modern healthcare services and their inter-dependencies Furthermore, clinical effectiveness as argued by Featherstone and Baldry (2000) has a narrow academic focus, with little or no appreciable relevance to customers and clinicians in this sector where rationing of resources determines the quality of care to be delivered to patients. This argument is much appreciated in the commercial business service sector where most successful organizations base their competitive strategy by putting customer issues first before any other organizational objectives.

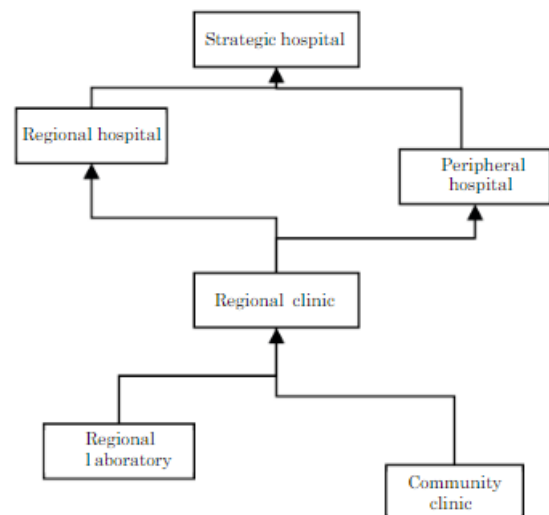


Figure 2: Architecture of healthcare facilitiescommunity, regional and hospital-based. Community clinics are located in any city, town or village, and are approximately 500–2,500 m2 in size (mean size of 1,200 m2). In the entire country, there exist 1,000 community clinics that provide close ambulatory and primary care to an average of 8,000 insurance subscribers per clinic. Forty re-gonial clinics support the community clinics, pro-viding secondary care such as MRI, X-Ray, medical consultancy and regional laboratories that

supply diagnostic services to both community and regional clinics. This network acts as a screening net that provides primary care to all patients insured in the Israeli system, prior to admission into a peripheral or regional hospital. Hospitals are classified into three categories of infrastructure and medical care: peripheral hospitals (less than 400 patient beds), regional hospitals (401–800 patient beds) and strategic hospitals that provide unique specified care and are equipped with built and human medical infrastructure (801–1,500 patient beds).

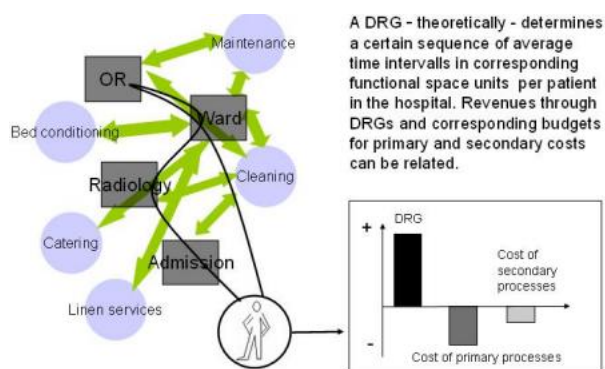


Figure 3: Patient's path through the hospital any primary core process a patient is obtaining can be structured on the level of main processes. The analysis of the primary main processes leads to primary process parameters P_k . To each primary core process, a process parameter P_k with a value of P_k' can be related. All pathways of a hospital's patients as a whole result in a primary process profile P . P can be specified mathematically as a map of the primary process's CPPs' sum: $CPP P_k \sum k \rightarrow 71$ with $CPP_k = \text{Primary core process } k \in K; K = \{1, 2, 7\}$ P = profile of primary process parameters.

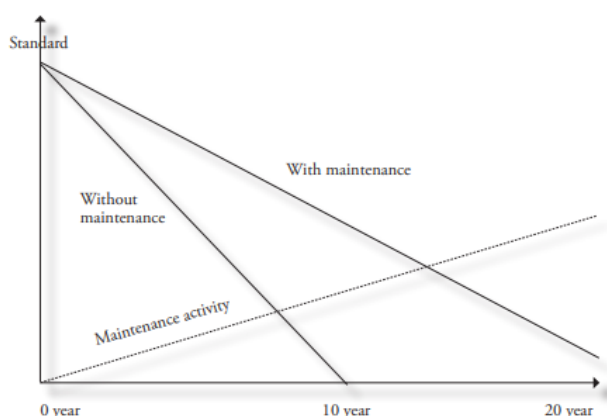


Figure 4: The relation between the standard of a building and its maintenance apartment blocks every day and knows when it is time to take action in order to maintain the performance of the property in the block. This indicates a need for information about the expected longevity of each of the components in the building, and of

information about how to handle them to keep them functioning for as long as possible. Since a building is a collection of very many different parts, it would be convenient to organize them into objects. The quality of the object is then a function of the quality of each of the included components.

CONCLUSION

Existing methods for facilities management decision-making are limited, particularly at the strategic level of facilities management. This research focused on identifying principal parameters that affect the performance and maintenance of facilities throughout their service life. An integrated healthcare facilities management model has been developed, which proposes simultaneous analysis of the complexities involved in the field, such as resource allocation and setting of maintenance policy for a given level of performance, or improving efficiency with which the implementation of maintenance activities is carried out. These complexities are dealt with by almost all facility managers of public as well as private facilities; nevertheless, this point is even more crucial and significant in healthcare facilities that operate 24 hours a day, seven days a week, provide care and treatment services, and support critical infrastructures of healthcare such as medical gas and power for operating theatres. The model developed in the research includes 15 procedures, out of which five core procedures were discussed in the frame of this paper: building performance indicator, facility coefficient, annual maintenance expenditure, projected performance, and maintenance efficiency indicator. The implementation of the methodology was illustrated by two case studies that confirmed the viability of the model. Both of these case studies show high correlations and significant results, by predicting different FM-related aspects, such as the level of performance and the required maintenance budgets. The model's robustness was examined using sensitivity analyses. Two principal factors were considered: inaccuracies in the performance scores, and sensitivity to the hypothesized deterioration patterns of building components. Robustness of the predictions of the model is achieved primarily due to the central limit theorem. The present research enables an analytical hierarchical process for facilities maintenance strategic and operational decision making by simultaneous analysis of facilities maintenance core parameters. The core procedures are illustrated in this research with the building performance indicator, facility coefficient for the adjustment of the maintenance resources to prevailing building environment and occupancy, and maintenance efficiency, as expressed by the ratio between expenditure on maintenance and performance.

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