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Competition and Technical Efficiency for General Medical and Surgical Hospitals in Georgia

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Walden University

College of Health Professions

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Nathan Ekow Davies

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Walden University
2021

Abstract

Competition and Technical Efficiency for General Medical and Surgical Hospitals in

Georgia

By

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MS, Southern New Hampshire University, 2017

MPH, University of Ghana, 2013

BA, Morehouse, 2007

Doctoral Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Healthcare Administration

Walden University

January 2022

Abstract

The primary aim of this study was to enhance understanding of the fundamental socioeconomic problem associated with inefficient hospital competition in the United States in terms of demand and supply of services as well as the efficiency of hospitals. The relationship between market competition and hospital efficiency was investigated among general medical and surgical hospitals in Georgia. The X-efficiency theory was used which defines efficiency as the degree of effectiveness that an organization can maintain while operating in imperfect competition. The theory is most applicable in terms of addressing imperfect market characteristics of the healthcare industry. Correlations between efficiency and competition were conducted. Secondary data from all hospitals in Georgia were analyzed to test hypotheses. Statistical data were employed involving descriptions to assess population tendencies and correlations to test efficiency of technology and best practices. Specifically, a t-test with multiple regression data analyses tested hypotheses. Study findings revealed that for-profit hospitals have slightly higher efficiency than nonprofit and government hospitals. Also, results suggested that highly skilled hospitals have relatively low average costs, high profit margins, and high labor productivity. These findings may be used by hospital administrators to better serve their patients and communities.

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Dedication

I want to dedicate this doctoral study to all medical professionals whose primary intention is to improve the quality-of-service delivery in healthcare institutions as well as embrace the merits, which come along with the incorporation of technology. I dedicate this study to all the stakeholders who believe in the essence of revolutionizing healthcare and curtailing the high cost of care in society.

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The pursuit of education is an incredible journey filled with challenges, obstacles, and sacrifices. Although challenging, the process would have been incredibly difficult without the encouragement and support I received from my family, friends, committee members, and the Almighty Yeshua. I want to express my gratitude to Dr. Lee Bewley, my committee chair, for the guidance and support he provided throughout the development of this study. I also want to thank my coach and committee members, for their leadership and help associated with statistical methods. Besides, I would like to thank Dr. Suzanne Richins, University Research Reviewer, and J. D. Bell for “sparking” the idea for me to delve into hospital/healthcare economics in the first place.

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Section 1: Foundation of the Study and Literature Review

Introduction

The inefficiency of healthcare in the United States (US) and resultant high costs have fueled concerns involving the sustainability of the healthcare system (Fuchs, 2018; Garber & Skinner, 2008; Glied & Sacarny, 2018; Rosko et al., 2017). The healthcare system in the US has been described as heterogeneous, fragmented, competitive, and advanced (Garber & Skinner, 2008). In addition, the system has been described as wasteful (Fuchs, 2018) and inefficient (Glied and Sacarny, 2018). Inefficiencies in the healthcare system have been operationalized in different ways by different researchers. Christofferson (2019) said the US spends three trillion dollars annually on healthcare, an equivalent of 17.1% of the country's gross domestic product (GDP). Life expectancies of men and women in the US are ranked last and second to last, respectively, compared to the life expectancy of citizens in the seven wealthiest nations. The US has the highest infant mortality among these countries, and 10% of the population is uninsured (Christofferson, 2019).

Results of distorted market signals and detailed rules used by insurance providers lead to entrenched inefficiencies, burdening of providers, and frustrated patients (Hathaway & Rothwell, 2015). Kumar et al. (2011) said the system is inefficient despite being the most expensive globally. As a result, inefficiencies have left citizens vulnerable to burgeoning costs. Therefore, there is a need to improve the efficient management of resources in health facilities.

Economists view efficiency as either technical or allocative (Veblen, 2018).

According to Rosko et al. (2017), an organization is technically efficient when it produces a maximum output from a given input. Efficiency occurs when it leads to a high output with minimum input quantities. Technical efficiency determines the quality of healthcare services provided to patients (Rosko et al., 2017). Shortage of health resources may lead to poor economic performance, high population growth, and a decline in public spending (Veblen, 2018). Allocative efficiency involves allocating minimal amounts of resources required to achieve an outcome (Akazili et al., 2008). In most states, healthcare facilities consume the most significant portion of the public health budget (Rosko et al., 2017). Every state has the objective of improving efficiency, and health policies emphasize using scarce health resources effectively (Rosko et al., 2017). Policy enactment creates an avenue of competition for various hospitals and encourages the use of allocated resources efficiently.

The scarcity of healthcare resources is a critical economic reason why careful attention should be paid to productivity and appropriate current resources. Based on GDP, the monetary measure of the value of all goods and services produced and delivered within a year, healthcare expenditures in the US have grown substantially from 6% of the GDP in 1980 to 14% in 2015 (Meesala & Paul, 2018). Therefore, the use of allocated resources effectively to achieve sustainable healthcare for everyone is essential. Furthermore, determination of the optimal rate of resource use and identification is also necessary for ensuring higher efficiency. As a result, assessing hospital efficiency while

promoting mobilization and justification of resource allocation can help achieve higher efficiencies. This is a critical responsibility of health administrators.

Technical efficiency is the ability of managers to ensure proper decision-making to produce maximum output from a specified level of input (Veblen, 2018). It goes beyond resource allocation and involves exploring influences of process aspects on overall efficiency (Akazili et al., 2008; Mark et al., 2009).

According to Samut and Cafri (2016), attainment of higher efficiency despite scarce resources should be the main criterion for setting priorities. Efficiency is defined as the relationship between various inputs such as labor, capital, and equipment and intermediate outputs that include several treated patients and waiting time. Before adopting criteria for health efficiency, individuals should make informed choices regarding healthcare plans to attain optimum care.

In Georgia, for example, the Georgia Free Clinic Network provides medical care at no cost on a low fee scale, which is dependent on the size of families and their incomes (Samut & Cafri, 2016). According to Morgan et al. (2016), there has been competition between various hospitals in Georgia regarding the delivery of health services to patients. This competition can improve the quality and process of healthcare provision. Competition improves the quality of services and the delivery process because various providers improve their service delivery process to enhance their competitive advantage (Brown, 2008). Resultant improvements in terms of quality-of-care increase customer satisfaction (Morgan et al., 2016).

Various factors determine competition between general medical and surgical hospitals, including the external environment, strategic mission, and internal goals (Morgan et al., 2016). Traditional competition between general medical and surgical hospitals in Georgia involved price, convenience, and superior services practitioners of these healthcare facilities (Morgan et al., 2016). Rothwell (2016) said competition consists of the potential to provide a mechanism that reduces medical care costs. Technical efficiency is a critical factor of competition between healthcare facilities (Rothwell, 2016). Competition ensures that healthcare resources are being used effectively. Therefore, general medical and surgical hospitals in Georgia that use their resources effectively can be regarded as highly competitive. Apart from technical efficiency, prevention, proper diagnoses, treatment of specific diseases, higher value, and provision of correct information characterize positive competition (Morgan et al., 2016). General medical and surgical hospitals should also offer alternatives for specific conditions to remain competitive.

According to Rothwell (2016), healthcare in the US is complex, and understanding the efficiency of inputs and competition is one way that medical services may be improved. The US has the most expensive medical care system in the world (Rothwell, 2016). This causes systematic healthcare inefficiencies. Rothwell (2016) said a reduced standard unit of output (SUO) per staff in private and public health centers. There had been no improvement in efficiency in the recent past despite continued competition from the private sector. Lack of progress inefficiency is a significant threat to the healthcare system, implying that providers are mainly competing in terms of quality

and not price. One of the possible consequences is healthcare products and services that are economically inaccessible for most people.

Problem Statement

Technological efficiency in the healthcare system is entwined with competition among medical service providers. Rothwell (2016) argued that state laws such as the Financial Provision Act and Insurance Act protect hospital monopolies, creating barriers to entry by raising costs. Additionally, state licensing regulations such as the Health Insurance Portability and Accountability Act (HIPAA) restrict qualified healthcare providers from practicing independently (Rothwell, 2016).

Medical and surgical hospitals have been influenced by competition to adopt practices that improve social and economic efficiency. The problem that I explored in this research is a lack of understanding regarding the relationship between competitiveness and technical efficiency in the US healthcare system. Efficiency in health institutions indicates how well hospital resources have been used to achieve goals and objectives (Longo et al., 2019). Longo et al. (2019) said efficiency implies the use of available resources to attain defined goals, leading to more and superior medical output and customer satisfaction. A hospital facility is efficient if it provides beneficial effects to its clients.

Increased competition in an industry forces industry players to improve technical efficiency to ensure they remain relevant. The Herfindahl-Hershman Index (HHI), which is used to address market concentration, could evaluate the level of competition among general medical and surgical providers. The HHI includes information regarding the

concentration of hospitals. High HHI levels indicate a high concentration of hospitals in each area. The higher the concentration of hospitals, the higher the competition levels. Market concentration is measured using the HHI, which has a range from 0 to 10,000. The HHI has the following market concentration categories: unconcentrated ($HHI < 1,500$), moderately concentrated ($1,500 \leq HHI < 2,500$), highly concentrated ($2,500 \leq HHI < 5,000$), and super-concentrated ($HHI \geq 5,000$). The level of market concentration has an impact on healthcare provisions. According to Narci et al. (2015), the concentration of healthcare facilities has influenced variables such as the total number of hospitals, insurance coverage, and human resource allocations. As technical efficiency increases, so does competitiveness in the market (Narci et al., 2015).

In hospitals, the average length-of-stay, admission versus discharge rates, and occupancy rates are measures of effectiveness. However, the appropriateness of methods depends on desired goals. Longo et al. (2019) illustrated that an effective way of measuring competency in a healthcare facility is SUO per staff or costs of providing medical care services using the output and input value. Output-input criteria include therapeutic output services and inputs that are measured using a weighted average of the total production. For example, assessment of outpatient equivalence involved using weights of 15 for inpatient, 1 for outpatient, 5 for deliveries, 0.5 for antenatal care, and 0.2 for vaccine doses to calculate the SUO for hospitals (Longo et al., 2019).

Implications of the Study

According to Yip et al. (2015), technical efficiency in the healthcare system is critical to the sustainability and progress of society. Social change in a healthcare system

requires more than the allocation of money into the system. In this study, I recognize that social benefits improve people's quality of life. Through this study, I provide insights regarding inefficiencies in the health sector that appropriate stakeholders need to concentrate on to enhance quality health services to the public.

Further, I explored how wasteful resource use and lack of accountability cause economic redundancies in the healthcare system. This study may provide health policy formulators information regarding inefficiencies of healthcare and recommendations that can be used for effective healthcare formulation. In addition, I explain the roles stakeholders can play to improve healthcare provision and cause social change. By reiterating the importance of competitiveness in the healthcare system, this study may be used by state healthcare policymakers to create a competitive environment between private and public healthcare institutions in Georgia. Creating such opportunities will have economic benefits on citizens, as they are likely to enjoy better prices in terms of healthcare provision. The study is relevant because taxpayers, patients, and Georgia society at large would benefit from an in-depth understanding of competition in the healthcare industry and how it influences citizens' healthcare outcomes and overall quality of life.

Purpose of the Study

This quantitative regression analysis aimed to investigate the relationship between competition and technical efficiency of general medical and surgical hospitals in Georgia. I examined correlations between competition and technical efficiency within the public medical and surgical hospitals in Georgia in the absence of specific standards available to

healthcare leaders. This relationship is vital because competition in medical care serves as a natural catalyst for cost-effectiveness and improvement in terms of healthcare centers and hospitals providing medical care.

This study aimed to evaluate the association between levels of competition and technical efficiency in general medical and surgical hospital markets. I measured technical efficiency via variables such as the number of staff and beds. HHI scores were used to measure the competitiveness of the healthcare sector in Georgia. I also compared efficiency levels against HHI scores.

Attaining maximum resource efficiency is attributed to the technical and allocative efficiency of resources. Therefore, the positive influence of competition on efficiency is one of the central assumptions in this study. I controlled supply and demand variables such as the number of hospitals in the area, number of beds, hospital ownership, bed size, and specialties offered, and demographic variables such as population, poverty level, and insurance coverage. Competition in medical care provision requires consideration because it serves as a natural catalyst for cost-effectiveness and improvements in terms of how hospitals and healthcare centers provide medical services.

The target population of the study was general and surgical healthcare stakeholders in the state of Georgia. The topic is relevant for healthcare administrators, given that the competency of medical institutions contributes to competition, thus lowering the costs of treatment. In different hospitals across the country, performance differs, and establishing the relationship between competition and technical efficiency will provide the basis for constructing policies to improve healthcare providers

nationwide. Additionally, patients prefer highly efficient hospitals (Bloom et al., 2015). Data were collected from general and surgical hospital databases in Georgia. Statistical analysis was used to analyze data to inform the formulation of recommendations for improving the efficiency of hospitals.

Research Questions and Hypotheses

RQ1: Is there a correlation between technical efficiency and competition across general and surgical hospitals in Georgia?

H₀₁) There is no correlation between technical efficiency and competition across general and surgical hospitals in Georgia.

H_{a1}: There is a correlation between technical efficiency and competition across general and surgical hospitals in Georgia.

RQ2: Does hospital ownership significantly impact the relationship between competition and technical efficiency across general and surgical hospitals?

H₀₂: Hospital ownership does not significantly impact the relationship between competition and technical efficiency across general and surgical hospitals.

H_{a2}: Hospital ownership significantly impacts the relationship between competition and technical efficiency across general and surgical hospitals.

Theoretical Foundation

In this section, the models and theories of healthcare that I used in this study are explained. This investigative study involved exploring the influence of competition in medical institutions in terms of efficiency. Healthcare policies governing the US, such as Medicaid, Medicare, and the Healthcare Quality Improvement Act, have a significant

impact on the operations of health institutions. Finally, I discuss specific methods of enhancing improved care without exploiting customers.

I employed the X-efficiency theory. The theory is one of the approaches used to measure technical efficiency in the healthcare industry regarding the competition (Christian & Crisp, 2012). According to Frantz (2018), human elements can exist caused by workers and management that could influence a firm's ability to maximize profits. Therefore, the theory was used to emphasize the role of competition in terms of achieving efficiency for firms.

The inability of institutional management to maximize profits is referred to as x-inefficiency (Frantz, 2008). In firms in highly competitive industries, organizations are more likely to be efficient as all stakeholders exert efforts to ensure their competitiveness. Conversely, firms that are in less competitive industries are likely to experience x-inefficiency as they choose not to maximize profits due to little motivation (Bernet et al., 2011). The X-efficiency theory explains why companies in noncompetitive environments achieve less technical efficiency because they face no threats from competitors.

Conceptual Framework

Optimal efficiency in providing healthcare, a public good, requires cost-effective provisions of products and services (Ward & Johnson, 2013). Ward and Johnson (2013) identified economic optimality as when minimal functioning results in maximum output. Therefore, one possible way of addressing economic efficiency in medical care in terms of social welfare is through establishing the relationship between hospital staff per bed as a unit of energy and the HHI as a measure of competition for hospital facilities. As a

result, in this study, I chose Narci et al.'s X-efficiency Theory to determine the relationship between hospital competition and technical efficiency in general medical and surgical hospitals in Georgia.

Narci et al.'s conceptual framework involves the following mathematical expression: *Technical efficiency variable* = $B_0 + B_1 * \text{Herfindahl-Hirschman Index} + V$ (*control variables*) + *Error*, whereby B_i is the coefficient of regression and V the coefficient of the control variable.

I performed a multivariate regression analysis based on cross-sectional data and compared results with the empirical literature on technical efficiency and competition to address the objective of the study. The study is based on the hypothesis that competitor in the healthcare industry leads to improved efficiency, as competition demands outcomes resulting in the improvement of organizational performance. In addition, the competition serves as a natural catalyst to spur motivation to improve processes and capabilities and attract clients.

Nature of the Study

This study was a quantitative analysis of cross-section archival data. I used linear regression and multiple regression analyses. I also used data envelopment analysis (DEA) to determine the production efficiency of each technical variable before performing a regression analysis. Finally, I examined the relationship between competition and technical efficiency among Georgia's general medical and surgical hospitals.

Literature Search Strategy and Keywords

The literature review involved the following databases: The American Hospital Association (AHA Guide), 2019 and the American Hospital Directory (AHD). My main aim was to locate sources that would provide important information. American Hospital Association (AHA) and Department of Public Health (DPH) websites were rich sources of information. Additional data were gathered from the public health information portal and health facilities in Georgia. The study helps determine extra costs of medical care that arise from inefficiencies in the delivery of care. Investigating the apparent relationship between staff and beds and HHI scores for hospitals will motivate hospital management to address client needs efficiently.

Literature Review

A meta-analysis was performed by Brand et al. (2012) on hospital characteristics associated with improved hospital performance. The study assessed associations between high-level structural and operational hospital characteristics and medical performance measured through the average length of stay, readmission criteria, the average cost per discharge, and occupancy rates. The study appraised 57 studies and found a profound relationship between hospital characteristics and medical care efficiency, some of which include its structure, operational design, and the market environment. The hospital's operational design factors include organizational culture, innovativeness, information technology systems, public reporting practices, services activity and planning, patient safety practices, decision-support systems, staff training, workforce design, and staff education. The essential factors in the structure of the hospital include its ownership,

network membership, geographical setting, teaching status, and service size (Brand et al., 2012).

Guida et al. (2018) sought to measure competition among medical care providers through top-level 'managers' perceptions and discharge rates. Their study also aimed to examine a correlation between competition and discharge levels for total recovery rates. The cross-sectional research sampled patients discharged in 2015 for AMI or CHF and 2014 patients of cardiac surgery. Measures of hospital competition focused on the location of the hospital. The study established that hospital recovery rates/discharge rates after AMI decreased with competition in areas identified by the Radius Method. These are areas where a specified radius defines the location. However, measures of hospital competition shifted per the local market definition.

Curtis et al. (2014) said technical efficiency in healthcare facilities could be improved after conducting extensive research that determines the economic elements that should be considered to enhance the utilization of resources while ensuring better health outcomes for the patients. GDP allocation for healthcare was 18% in 2018 (Curtis et al., 2014).

Cooper et al. (2012) applied an estimation strategy to assess the impact of competition between private and public sector hospitals and its associated role in the efficiency of the hospitals. The average length of stay in the assessed hospitals serves as a measure of technical efficiency. The longer a patient stays in the hospital, the higher the associated healthcare costs (Ali, Debela, and Bamud, 2017). Technical efficiency in this aspect would entail only keeping the patients in the hospital for the least amount of time

required to achieve positive patient outcomes (Zere et al., 2006). The study established that competition from public hospitals spur private health care providers to improve their performance, while public hospitals did not draw motivation from the individual match. In the contemporary world, the medical industry is faced with the inflated cost of treatment services. Therefore, scholars have raised concerns about the significant shortage of resources in health facilities (Rosko et al., 2017).

The main variables of the research were divided into three major sections that included the dependent variables, the independent variables, the input variables, and the output variables. The focus of the literature review is mainly to provide a collection of the data concerning the sources collected.

Ownership Type and Technical Efficiency in Hospitals

Kalhor et al. (2016) used DEA analysis to test the hypothesis of a significant relationship between hospital ownership type and technical efficiency. The analysis result indicated that social security hospitals had the highest technical efficiency score, followed by private and university hospitals with 84.29 and 79.64, respectively (Kalhor et al., 2016). Analytical findings thus concluded that a significant relationship existed between ownership type in terms of specialization and duty and technical efficiency among hospitals in Iran.

Hsiao et al. (2018) note that the scale and duty of hospitals when it comes to achieving technical efficiency are of concern to hospital managers. The extent of technical efficiency however differs between public and private hospitals due to the differences in ownership management and goals (Hsiao et al., 2018). Hsiao et al.

conducted a DEA investigation to identify the relationship between technical efficiency and ownership in Taiwan. The findings of the study identified that private hospitals were more efficient in providing healthcare as opposed to public hospitals.

Use of DEA in Healthcare Studies

In the healthcare industry, DEA is a significant application that allows for the study of efficiency. According to Sultan et al. (2018), DEA is a universal non-parametric method used to evaluate performance. In analyzing the relationship between efficiency in public hospitals in Palestine, Sultan et al., 2018 identified key contextual drivers of efficiency in healthcare. In the study, the researchers employed a two-stage DEA analysis where the hospital efficiency and efficient frontier were analyzed in the first stage (Sultan et al., 2018). The physical inputs helped in producing the outputs. In the second stage of DEA analysis Sultan et al., 2018 used Tobit regression to regress efficiency scores against the contextual factors that are likely to influence hospital management. The DEA analysis results indicated that the 'hospitals' ability to transform inputs into output depends on the efficiency level of managerial practices and the 'hospitals' operating environment. As such, Sultan et al., 2018 concluded that it is vital to relate the inefficiencies measures with the contextual factors to understand efficiency differences across hospitals. In the DEA analysis, Sultan et al. (2018) generalized their research on public hospitals without classifying if ownership and the type of hospital had any impact on the outcomes of the DEA results offering a research gap for future research.

A study conducted by Narci et al. (2015) utilized DEA analysis in investigating the relationship between competition and hospital efficiency in Turkey. Specifically, the

researchers aimed to explore the impact of competition on technical efficiency in the Turkish hospital industry. The study, however, took a different approach from previous studies by investigating if hospital ownership had any impact on the relationship between competition and efficiency by focusing on both private and public hospitals (Narci et al., 2015). The DEA analysis (Narci et al., 2015) used five inputs and five outputs. The analysis measured the level of competition among the hospitals using both subjective and objective measures. Narci et al. (2015) achieved objectivity in the DEA analysis by using the Hirschman-Herfindahl Index to measure the competition levels. To validate the results of the HHI analysis Narci et al., 2015 measure subjective competition among hospitals.

Further, the research used Tobit regression analysis while controlling for supply and demand in the hospital industry market. The result of the DEA analysis led to the conclusion that the level of competition did not have any significant effect on the Turkish 'hospital's efficiency. In a more recent study, Kohl et al. (2019) reviewed the application of DEA in the healthcare sector. Kohl et al., 2019 found that DEA could be used to determine hospital efficiency by analyzing the effect of a managerial factor on hospital efficiency.

Control Variables

According to Berneth, Cole, Taylor, & Walker (2018), control variables are meant to remain unchanged throughout the experiment. These control variables included both resources and the current position of the state. Colla et al. (2015) said within the state, poverty rates and insurance coverage have a direct impact when it comes to the quality of

healthcare service that is provided within the hospitals. Poverty rates and insurance coverage bring attention to the need to improve the efficient management of resources. Economists view efficiency as either technical or allocative. An organization is technically competent when it produces the maximum amount of output from the given input or when it produces a high output using minimum input quantities.

Technical efficiency determines the quality of the services that are provided to the patients (Rosko et al., 2017). A shortage of health resources may be a result of poor economic performance, high population growth, and a decline in public spending. In most states, the US, healthcare facilities consume the most considerable portion of the public health budget. Every state has the objective of improving efficiency. The health policies place a great emphasis on utilizing scarce health resources more effectively. The health policies create an avenue of competition for various hospitals, and this encourages them to use the allocated resources efficiently.

The scarcity of healthcare resources is a critical economic reason why careful attention should be paid to the productivity and appropriate use of current resources. In the past decades, the healthcare expenditure of the United States has grown substantially from 6% of the GDP in 1980 to 14% in 2015 (Meesala & Paul, 2018). Some of the consequences of failing to utilize scarce resources efficiently include an over-allocation of resources that is not commensurate to the outcomes. Therefore, it is essential to use the allocated resources effectively. It is also necessary to determine the optimal rate of resource utilization and identify the ways of ensuring higher efficiency. The determination can be achieved by assessing the 'hospital's effectiveness while promoting

the mobilization and justification of resource allocation as a vital responsibility of the managers in these health care facilities.

Explanatory Variables

Within this case, the focus is more on two significant variables that include the Herfindahl-Hirschman and the index. According to Cracau and Lima (2016), the Herfindahl-Hirschman is the measure of the size of firms concerning the industry and an indicator of the amount of competition among them (Lu et al., 2017). Mostly, the index ranges from zero to 10,000 based on several factors that lie within the economic sector and include competition law, antitrust, and technology management.

Technical efficiency refers to the ability of the manager to ensure proper decision-making to produce maximum output from the specified level of input (Akazili et al., 2008; Mark, Jones, Lindley, and Ozcan, 2009). The input-based model can be used, and it minimizes the contributions to provide a specific level of production. Such models help the decision-makers to solve the challenge of balancing the high demands for healthcare services with the allocated funds. Economists in the United States argue that the attainment of higher efficiency from scarce resources should be the main criteria for setting priorities (Samut & Cafri, 2016). The ability should measure whether the healthcare resources are being utilized in the best value for the monetary resources. Efficiency is also concerned with the relationship between various inputs (labor, capital, and equipment) and the intermediate outputs (number of treated patients and waiting time) or the output (life years and health quality of the life years) which are the final health outcomes (Samut and Cafri, 2016). Before adopting a criterion for health

efficiency, society should make good choices that maximize the health outcomes that are acquitted from the resources that are allocated to the health care facilities and systems.

Outcome Variables

Technical efficiency was the last category of variables discussed in the literature review. This category of variables included the staff bed, average length of stay, and bed occupancy rate, which all affect the prices of competition and cost. Gu and Itoh (2016) said most people who lack insurance coverage fail or fear staying long within health care facilities to avoid being overcharged. Features such as the bed occupancy rate and the average length of stay are significant in not only the quality of health provided but also in other factors such as the cost of healthcare services and the likelihood that a patient will return to that same facility.

Healthcare facilities in Georgia have introduced various healthcare policies and systems, which are aimed at improving the health outcomes for the patients. For example, the Georgia free clinic network provides medical care at no cost on a low fee scale, which is dependent on the size of the family and the income (Samut & Cafri, 2016).

Competition can improve the quality and process of healthcare provision. The competition also results in a decreased cost of health care provision, and this causes increased customer satisfaction (Morgan et al., 2016). Various factors determine the competition of general medical and surgical hospitals, including the external environment, strategic mission, and goals in the internal environment.

The traditional competition between the general medical and surgical hospitals in Georgia revolved around the elements of price, convenience, and superior services that

were provided with the practitioners of these health care facilities. In modern times, the crucial role of competition is the potential to provide a mechanism that reduces medical care costs. Technical efficiency is much considered as a critical factor of competition between healthcare facilities. The game is based on the aspect of ensuring that healthcare resources are being used effectively. Therefore, the general medical and surgical hospitals in Georgia that use their resources effectively can be regarded as highly competitive compared to those who do not use the funds in a manner that ensures better health outcomes with low inputs. Apart from the technical efficiency, the aspects of prevention, proper diagnoses, treatment of specific diseases, a higher value should characterize a positive-sum competition, and the provision of the correct information for the health care provides (Morgan et al., 2016). The general medical and surgical hospitals should also offer alternatives for specific conditions to remain competitive. Therefore, it is essential to combine the technical efficiency and various aspects of health care providers to ensure a successful competition in the general medical and surgical hospitals.

Previous researchers to measure the level of competition in the healthcare sector have used the HHI. . The index indicates the level of market concentration in the health sector; the smaller the HHI, the more competitive the market. The fixed radius method can be used in the calculation of the HHI. For example, Deng and Pan (2019) utilized a 15- mile radius around each of the hospitals under study. Deng and Pan (2019) explore the relationship between HHI and other variables, such as hospital charges. The study revealed that there is a significant relationship between HHI and hospital efficiency in

terms of charges. According to the existing literature, the HHI greater than or equal to 0.25 is the induction of non-competitive news in the healthcare industry (Deng and Pan, 2019). Narci et al. (2015) further note that HHI is the best measure for objective competition in healthcare. Chua et al. (2011) found a positive relationship between efficiency and HHI scores.

HHI

According to Feng et al. (2015), the HHI is the primary measure of hospital market concentration in economics. The HHI can be used to measure technical efficiency for each hospital site. The hospital sites are often referred to as the local market. The market concentration can be measured in layers. The patient flow method is the most popular method they utilize HHI to measure market concentration (Feng et al., 2015). The first step in the patient flow method is to use HHI to measure market concentration in each location, often defined as middle layer super output areas (MSOAs). The second step involves measuring the concentration of each hospital, often calculated as the Weighted Average of the MSOAs (Feng et al., 2015). The HHI is preferred as a measure of competition as it considers both the size and the number of different service providers. The aim of using HHI in healthcare studies is not to measure the potential for competition in the industry but rather to offer a clearer picture of the current competition level at the time of the study (Deng and Pan, 2019). Feng et al. (2015) said market structure is a significant dimension of competition analysis in the healthcare industry. Providers in the healthcare industry will alter their behavior and strategies, depending on the level of competition they face. HHI reflects the number of competitors in the industry. Narci et al.

(2015) favor the use of HHI as it gives credit to the size of the firm. Higher weight is given to more substantial firms than smaller firms. Feng et al. (2015), notes that HHI has been used widely in studies that explore the relationship between competition and technical efficiency.

Literature Summary

One effective way of improving technical efficiency for medical care providers is through increased competition (Liu et al., 2018; Ravangard et al., 2014). This suggests why health administrators work hard to improve service delivery to attract patients. However, in medical care, competition is an instrument for organization decisions about the use of resources rather than a goal (Meesala & Paul, 2018). Meesala and Paul (2018) said medical care providers in a region provoke hospital administrations to look for ways of improving and maintaining their services. As a result, competition increases, which in turn contributes to better management techniques geared toward reducing costs (Bloom et al., 2015). Among the US states and the diverse nature of the medical care landscape, Georgia offers a viable state in which a comprehensive medical care system exists.

Definitions

Herfindahl-Hirschman Index (HHI): A commonly accepted measure of market concentration. HHI score is calculated by squaring the market share of each firm competing in a market and then summing the resulting numbers (Hayes, 2019). This measure is essential when trying to understand the competition within a market. A monopoly might exist in a market even when there are other competitors. The dominance of one player can expose the low competition power of others in the market. By

comparing the 50 most prominent operators in any industry, the HHI score describes the health of the industry by determining whether the industry is trending towards a monopoly or whether the existing number of competitors is large enough to prevent the dominance of one operator (Hayes, 2019).

Hospital ownership: Shareholders or single owner of hospitals, which can either be publicly owned by the government or privately owned by individuals (Morgan et al., 2016).

Poverty rate: The poverty rate is the ratio of the number of people (in a given age group) whose income falls below the poverty line, taken as half the median household income of the total population (Ahmed, 2009).

Insurance coverage: The amount of risk or liability that is covered for an individual or entity by way of insurance services (Hathaway& Rothwell, 2015). Insurance coverage, such as auto insurance, life insurance—or more exotic forms, such as hole-in-one insurance—is issued by an insurer in the event of unforeseen occurrences

Occupancy Rate: The ratio of the number of beds occupied in hospital wards against the total number of beds available each year (Sauer et al., 2018)

Bed Size: Physical measurement of the length and width of hospital beds (Sauer et al. 2018).

County Population: Total number of people in a county based on latest census data (Duffin, 2019)

Number of Staff per Bed: Proportion of total number of staff members available against total number of hospital beds available annually (Sauer et al., 2018).

Length of stay: Number of days spent by patients in hospital wards during curative care (Longo et al., 2019).

Total Number of Beds: Number of hospital beds available for inpatient curative care (Sauer et al., 2018).

Assumptions

In conducting the quantitative study, I assumed that knowledge presented in the literature review is accurate as it only contains facts from peer-reviewed past researches. Some of the knowledge presented in the literature review was refined and advanced based on findings of the empirical study. The underlying assumption of the relationship was that there exists a positive relationship between the level of competition and technical efficiency. The data analysis is, however, performed to reveal if the assumption is valid and if any causal relationships exist among the constructs under study. I assume that the data collection process and the findings of the research was as objective and unbiased as much as possible.

Scope and Delimitations

The scope of the study is descriptive, with conclusions subject to the data provided to surgical hospitals in Georgia. The variable factors for the financial aspect of the health care provider are the main issue under investigation here. The generalization of the study is, however, limited to the technical efficiency and competition in the surgical hospitals in Georgia but ignores other factors that might also be crucial for investigation purposes in the hospitals. As such, the study is limited in the aspect of information, which is essential for the study.

Significance and Relevance

Through the study of competition and technical efficiency of general and surgical Georgia hospitals, it is possible to understand effectiveness of operations in hospitals outside of this study. Understanding competition and technical efficiency informs knowledge of care providers as well as patients. The relationship between competition and the technical efficiencies enhances knowledge of general medical care in the facilities, which makes this study important for the healthcare sector at large. Information from the survey can also be used in different industries where competition and technical efficiency are related or compared.

Section 2: Research Design and Data Collection

Research Design and Rationale

A correlational research design was employed to answer the research questions. The design involves determining the current magnitude of relationships between variables (Heppner et al., 2007). In this study, I determined the existence and magnitude of relationships between competition and technical efficiency in general medical and surgical hospitals in the US using a sample from hospitals in the state of Georgia.

Study Population

The study population included all general medical and surgical hospitals in the state of Georgia. A family consisting of four members that benefits from primary healthcare plans of employers incurs an average of \$28,116 in healthcare costs. This number has been increasing steadily over the last decade, with average costs of \$20,000 and \$25,000 in 2010 and 2016, respectively (Forward Forsyth, 2019). Businesses have also experienced difficulties in terms of healthcare costs, with benefits costs increasing at twice the rate at which employees' wages are increasing and thrice the rate of general inflation (Forward Forsyth, 2019). Studying the state of Georgia, where there is documented evidence of unaffordability and unsustainability, provides insights that can be used to understand associations between efficiency and competition in other states.

Sampling and Sampling Procedures

The research was conducted among general medical and surgical hospitals in Georgia aiming at establishing competitive and technical efficiency. The AHA guide

provided relevant data for the study. All 187 general medical and surgical hospitals were addressed using the AHA database.

Operationalization of Variables

Input variables considered in the study include number of staff and beds. Output variables used in the study are number of admissions and patient days. Independent variables are competition and ownership. The dependent variable in the study is technical efficiency in general medical and surgical hospitals in Georgia. Technical efficiency scores were calculated using DEA based on input and output variables. Multiple linear regression analysis was conducted involving listed variables to establish significance of specific variables in terms of informing the overall objective of the study. This was important in terms of determining whether there was a significant correlation between the independent and dependent variables.

Hospital Competition Using the HHI

The HHI was used to address the market share of each hospital in the industry and square them and sum the results. Market share for hospitals is the number of admissions received by the hospital divided by total number of admissions in Georgia. The HHI is used by several hospitals such as the Cancer Treatment Center of America, Atlanta Medical Center, and South Georgia Medical Center.

I estimated market share within a selected period. This was calculated by dividing the total number of patients visiting a hospital by total number of those who make such visits within a specific period.

In the case of perfect competition in the market, the value of HHI usually approaches zero. Assuming that for general medical and surgical hospitals in Georgia, the top 100 have 0.1% of the market share, then the value of HHI is $0.1^2 \times 100 = 1$.

Table 1

List of Variables

Variable type		Variable	Variable scale
<i>Independent Variable</i>		Competition	The market share (represented by the number of admissions in a hospital)
Independent Variable		Ownership	Nature of ownership (County, university hospitals, Profit or non-Profit model)
<i>Dependent variable</i>		Technical Efficiency	Represented by the number of staff and number of beds.

Table 2

Input and Output Variables for DEA Analysis

Variable Type	Variable
Input variables	<ul style="list-style-type: none"> • Number of staff • Number of beds
Output variables	<ul style="list-style-type: none"> • Number of admissions • Number of patient days

Strengths involved with using the correlational design method include comparison of two variables, which is essential to this study's outcomes. The correlational design was used to help determine future behavior based on gathered data. However, problems arise when confounding variables complicate relationships, or when there is no evident relationship between the two variables. The correlational study design was used to test hypotheses of the study.

Data Analysis Plan

DEA

The first step of this analysis was the calculation of efficiency scores. Efficiency scores were calculated using the HHI Index. Number of staff and beds were input variables, and number of admissions and patient days were output variables used via DEA to calculate hospital efficiency scores. The analysis generates efficiency scores for all units. It shows how much inefficient units need to reduce their inputs or increase their outputs to become efficient. It also identifies units which are performing best and operating practices which can then be examined to establish a guide to best practices. First, DEA analysis was conducted using the DEA-Constant Returns to Scale (CRR) model. The CRR linear programming model for 100 hospitals were used to obtain efficiency scores for each hospital.

Multiple Linear Regression

The second step in the DEA is conducting a multiple regression analysis was conducted to evaluate the relationship between technical efficiency scores and competition across the private, county, and university-owned hospitals in Georgia in answering RQ1. The HHI scores of each of the hospitals were regressed against the technical efficiency scores obtained in the DEA-CRR method. I performed the multiple regression analysis using the SPSS software. I also applied the multiple regression analysis approaches to test for hypotheses related to RQ2. However, to test the relationship between ownership and technical efficiency, the technical efficiency scores were grouped based on whether the hospital is a private, public, or a university-owned hospital. The technical scores of each category were regressed individually against the specific HHI scores. The hospital category based on ownership with the highest efficiency score was inferred as the most efficient. I tested linearity in independent variables and dependent variables using scatter plots in SPSS. The Breusch- Pagan test tested for heteroscedasticity in data. I used the Durbin –Watson Test to test the independence levels of the variables. The Shapiro-Wilk test checked for the normality of data. The cook-distance test tested for biases in the model. Results of the multiple regressions were then interpreted. T-tests was used for hypothesis testing. The t-test showed that the hypotheses are statistically significant based on the data analyzed. I applied a p-value of < 0.05 as the threshold for declaring statistical significance in the hypothesis test at a confidence interval of 95%.

Threats to Validity

Threats to validity when using the correlation study design include confounding variables, but by excluding hospitals, not in the state of Georgia, confounding variables were eliminated except for the state of Georgia. Enough time is required to obtain adequate measurements and establish a reliable correlation. Other problems associated with the validity of this study are the various aspects addressed among the variables that could have a confounding effect, including different variables that might affect the time spent in the hospitals and staff out on leave that might affect the availability of staff per bed.

There are also multiple points to consider when interpreting the results of a linear regression model. For one, the regression model assumes that there is a direct relationship between the two variables x and y , and all sample observations must be independent of one another. Furthermore, the R^2 of the regression coefficient is dependent upon the units given for the measurement of the two variables. Similarly, the value of intercept depends on the unit used to measure the dependent variable, and its value might fail to apply to clinical or biological settings—for instance, when the value is zero. The regression equation should be applied only to independent variable costs that lie within the range of the benefits of the data initially used to derive the equation (Aggarwal & Ranganathan, 2017).

Ethical Procedures

In the study, I did not use any human subjects. However, information obtained from the AHA may contain data on patients. The entire study did not use any personal

data. In the case that personal data is needed, the study used identifiers to ensure the protection of the individuals. The data collected from the AHA was used for analysis and stored electronically for a period not exceeding two years after the publication of the research findings, after which it was deleted permanently. Any hardcopy data was shredded to ensure there is no trace of the data. Consent of the hospitals to be included in the study were sought via email. The Walden University Institutional Review Board (IRB) oversaw the data analysis and study conclusions. Confidentiality was observed during the data collection process. Only authorized persons were allowed to access the data.

Summary

The purpose of the study was to determine the correlation between competition and technical efficiency in the general medical and surgical hospitals in Georgia. The significance of the study is how inefficiencies in medical care are essential to control the overall cost of medical care. As implicated in previous studies, medical care is a necessity, and patients must get the best value for the money that they spend. Not only do the hospitals need to utilize the best technology available among competitors, but also patients and staff need to be efficient in handling the technology. When using the correlation design method and linear regression to analyze results, there are several considerations and variables involved, but the primary purpose of this study is to prove a positive correlation among the indicated factors.

Based on a one tail G*power calculation at a probability error of 0.05 and effect size 0.3, the minimum sample required for statistical significance at a t-value of 1.69 is 111 hospitals.

Section 3: Presentation of the Results and Findings

Introduction

Through the study of competition and technical efficiency in general and surgical Georgia hospitals, it is possible to understand effectiveness of operations in hospitals outside of Georgia. Understanding competition and technical efficiency informs knowledge of care providers as well as patients (Ranganathan et al., 2017). Addressing relationships between competition and the technical efficiencies, as well as care provisions in healthcare facilities, enhances knowledge of general medical care in facilities, which makes this study important for the healthcare sector at large. Information from the survey can also be used in different industries where competition and the technical efficiency care are related or compared to address service provisions.

I aimed to estimate the correlation between technical efficiency and competition across general and surgical hospitals in Georgia along with impacts of these relationships. Medicaid, Medicare, and the Healthcare Quality Improvement Act have a significant impact on the operations of health institutions. I used the X-efficiency theory. This theory has been adopted by healthcare industries that have inferior value in the market by using measurements of technical efficiency in the healthcare industry. The X-efficiency theory involves activities being performed by workers and management that may result in influencing increases in organizational profits. This theory was used to emphasize the role of competition in efficiency of healthcare organizations. Companies that are in less competitive industries are more prone to experiencing x-inefficiency as they choose not to increase profits, as there is little motivation (Bernet et al., 2011). This theory is used to

explain reasons for achieving in non-competitive environments compared to non-competitive environments where organizations face no threats from competitors. This theory has also been used by researchers in hospitals that resulted in reducing patient travel costs. In this study, the X-efficiency theory applies in terms of establishing how competition has affected technical efficiency. The output in the study is technical efficiency. Competition is the motivating factor, while inputs are the technical variables.

Data Collection of the Secondary Data Set

A correlational research design was used in order to answer the research questions. This is a design where the researcher does not control any of the variables but determines existing magnitudes of relationships between variables (Heppner et al., 2007). In this study, I sought to determine the existence and magnitude of any relationship between competition and technical efficiency in general medical and surgical hospitals in the United States of America using a sample from the hospitals in the state of Georgia.

Study Population

The study population includes all 98 general medical and surgical hospitals in the state of Georgia. The state of Georgia was selected as a representative market of the healthcare industry in the US because of trends in this market that are reminiscent of inefficiencies in the US healthcare industry. Healthcare costs are some of the largest expenses for both families and businesses in the state of Georgia. A family consisting of four members that benefits from a basic employee healthcare plan incurs an average of \$28,116 in healthcare costs (Forward Forsyth, 2019). Average costs were \$20,000 and \$25,000 in 2010 and 2016, respectively (Forward Forsyth, 2019). Businesses have also

experienced difficulties in terms of healthcare costs, with benefits costs increasing at twice the rate at which employees' wages are increasing and thrice the rate of general inflation (Forward Forsyth, 2019). Studying the state of Georgia where there is documented evidence of unaffordability and unsustainability provided insights that can be used to understand the association between efficiency and competition in other states.

Diagnostic Tests

Test for Linearity

In order to test the linearity of the regression the scatter plot graph between the dependent variable and independent was utilized.

Figure 1

Title of Figure 1

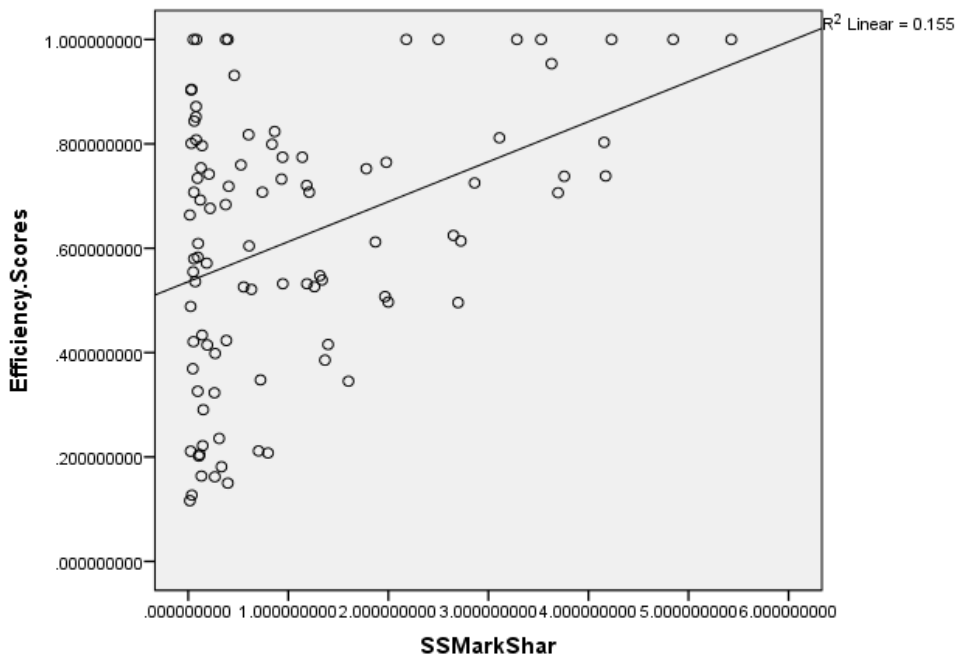


Figure 1 shows an uphill pattern moving from left to right, which indicates a positive relationship between technical efficiency scores and competition among hospitals in Georgia.

Test for Heteroscedasticity

A Breusch-Pagan test was used to test presence of heteroscedasticity (see Table 1).

Table 2

ANOVA Results

		ANOVA				
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.101	3	.367	6.622	.000 ^b
	Residual	4.822	87	.055		

Total	5.924	90			
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- a. Dependent Variable: Efficiency. Scores
b. Predictors: (Constant), Non-Profit, SSMarkShar, For-Profit

According to Table 3, the p-value of ANOVA is below 0.05 at a 5% level of significance; therefore, the null hypothesis was rejected, and data were heteroscedastic.

Heteroscedasticity robust standard errors were used in estimation of the relationship between variables.

Normality Test

The normality test for residuals was carried out based on Shapiro-Wilk statistic whose p-value was 0.013. At 5 percent level of significance $0.013 > 0.05$ hence do not reject the null hypothesis, concluding that the residuals follow a normal distribution at a % level of significance.

Results

RQ1: Is there a correlation between technical efficiency and competition across general and surgical hospitals in Georgia?

Pearson's product-moment correlation and linear regression analyses were performed to assess the relationship between technical efficiency and competition across general and Surgical Hospitals in Georgia. Table 1 below summarizes the descriptive statistics while table 2 presents results of the analysis.

Descriptive Statistics

Table 3 presents the descriptive statistics for the study variables.

Table 3

Summary Statistics

Variable	Mean	Std. Deviation	Min	Max
Efficiency Scores	0.6166	0.254	0.1163	1.000
SSMarkShar	1.053	1.307	0.0160	5.4275

Table 2 above, indicates that the technical efficiency levels of hospitals are spread over a wide range. The predicted general and Surgical Hospitals in Georgia specific technical efficiency ranged from 11.63 percent to 100 percent with an average mean technical efficiency score of 61.66 percent. Moreover, 11.6 percent of the general and Surgical Hospitals attained a frontier level of one hundred percent.

The results further showed that the minimum technical efficiency obtained by the hospital was 11.63 percent while the maximum technical efficiency achieved by the general and Surgical Hospitals was found to be 100 percent. The average technical efficiency score of 61.66 is below the frontier, inferring that there is room for improving hospital technical efficiency.

The mean competition score for the hospitals was 1.053 with a standard deviation of 1.307, while the minimum competition score for general and Surgical Hospitals was 0.0160 and the maximum competition score was 5.4275.

Regression Analysis

Table 3 presents the results for correlation regression and regression analyses.

Table 5

Correlations and Results From the Linear Regression

	Correlation with technical efficiency	Multiple regression weights	
		b	β
Efficiency.Scores (dependent variable)			
SSMarkShar	.394**	.077	.394

****p < .001**

The results presented in table 2 above, shows that technical efficiency was positively and significantly correlated with competition. This showed that the general and Surgical Hospitals with higher competition (SSMarkShar) tend to have higher technical efficiency. The linear regression model produced $R^2 = .155$, $F(1, 93) = 17.050$, $p(.000) < .001$. As indicated in table 2, competition had a significant positive regression weight, indicating that the hospitals with higher competition scores were expected to have higher technical efficiency.

Hypothesis Testing

H₀: There is no correlation between technical efficiency and competition across general and surgical hospitals in Georgia.

H_a: There is a correlation between technical efficiency and competition across general and surgical hospitals in Georgia.

Table 6*Regression Results*

		Coefficients				
		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	.536	.031		17.260	.000
	SSMarkShar	.077	.019	.394	4.129	.000

a. Dependent Variable: Efficiency. Scores

The regression analysis shows that there was a low positive correlation between technical efficiency and competition that was statistically significant. Since the t calculated (17.260) is greater than t critical 6.622, we therefore reject the null hypothesis that there is no significant relationship between technical efficiency and competition across general and Surgical Hospitals in Georgia. The analysis concludes that there was a significant relationship between technical efficiency and competition across general and Surgical Hospitals in Georgia.

RQ2: Does hospital ownership have a significant impact on the relationship between competition and technical efficiency across general and surgical hospitals?

A multiple linear regression was conducted to investigate the impact of hospital ownership on the relationship between competition and technical efficiency across general and surgical hospitals. Table 2 below provides a summary of the descriptive statistic and analysis results.

Table 7

Summary Statistics, Correlations and Results from the Linear Regression

Variable	Mean	Std	Correlation with technical efficiency	Multiple regression weights	
Efficiency.Scores	0.613	0.257		b	β
SSMark Pm Shar	1.053	1.307	.377**	.079	.402
For-profit	0.13	0.340	.154	.169	.225
Nonprofit	0.57	0.498	-.008	.018	.035
**p < .001					

Results indicate that nonprofits had a very low negative correlation with efficiency scores which was not statistically significant $p = .469$, while market share had a low positive correlation that was statistically significant $p < .05$. Further, For-profit indicated a very low positive correlation with efficiency scores that was not statistically significant $p = .073$. The multiple regression model with all three predictors produces $R^2 = .186$ $F(3, 87) = 6.622$, $p < .001$.

H_{o2} : Hospital ownership does not have a significant impact on the relationship between competition and technical efficiency across general and surgical hospitals.

H_{a2} : Hospital ownership has a significant impact on the relationship between competition and technical efficiency across general and surgical hospitals.

Table 8*Pearson Product-Moment Correlation*

		Correlations			
		Efficiency. Scores	SSMarkSha r	For-profit	Non-profit
Pearson Correlation	Efficiency.Scores	1.000	.377	.154	-.008
	SSMarkShar	.377	1.000	-.137	.144
	for Profit	.154	-.137	1.000	-.450
	Non-profit	-.008	.144	-.450	1.000
Sig. (1-tailed)	Efficiency.Scores	.	.000	.073	.469
	SSMarkShar	.000	.	.098	.087
	For-profit	.073	.098	.	.000
	Non-profit	.469	.087	.000	.
N	Efficiency.Scores	91	91	91	91
	SSMarkShar	91	91	91	91
	For-profit	91	91	91	91
	Non-profit	91	91	91	91

A Pearson product-moment correlation shows that that there was a low positive correlation between technical efficiency and market share that was statistically significant ($r = .377$, $n = 91$, $p < .001$), a very low positive correlation between efficiency scores and For-profit ($r = .154$, $n = 91$, $p = .073$), and a very low negative correlation between

efficiency scores and Non-profit ($r = -.008$, $n = 91$, $p = .469$). This model shows that the introduction of ownership only moderately increases prediction. Being a for-profit hospital increases efficiency score by .169 times compared to being designated as government hospitals. The non-profit designation did not make any significant difference compared to government designation in efficiency scores.

Market HHI value for the present study is estimated as 212.07. The market HHI value of the final sample is estimated as 265.77. Cases were removed that involving the missing staff, bed, admissions, patient numbers before calculation of DEA efficiency scores. The first research question involves the correlation between the technical efficiency and competition across general and surgical hospitals in Georgia. The efficiency has been calculated and predicted by competition by evaluating the market share, showing the result of a positive relationship. A significant model with weak prediction has been represented for the first research question. For this study, DEA analysis was used in order to establish a comparative baseline. The variables used in technical efficiency included the staff bed, average length of stay, and bed occupancy rate, which all affect the prices of competition and cost. The general medical and surgical hospitals in Georgia that use their resources effectively can be regarded as highly competitive compared to those who do not use the funds in a manner that ensures better health outcomes with low inputs. The HHI index has been used as an explanatory variable to measure level of competitiveness. The index indicates the level of market concentration in the health sector; the smaller the HHI, the more competitive the market. HHI greater than or equal to 0.25 is the induction of non-competitive news in the

healthcare industry (Deng & Pan, 2019). Narci et al. (2015) said HHI is the best measure for objective competition in healthcare. Chua et al. (2011) found a positive relationship between efficiency and HHI scores which signifies the same relationship in the present study. Here, T-tests have been used for hypothesis testing. The t-test shows hypothesis is statistically significant based on the data analyzed. A p-value of < 0.05 is applied as the threshold for declaring statistical significance in the hypothesis test at a confidence interval of 95%. For the first hypothesis, the *p*-value is estimated as $< .001$ representing a positive correlation between the technical efficiency and competition across general and Surgical Hospitals in Georgia.

RQ2 involves the relationship between competition and technical efficiency across general and surgical hospitals. The result represents a significant model with weak prediction. Analysis cannot be done with all three Ownership dummy variables entered. The Government ownership dummy code was not included and can thereby be considered the default case with the Non-Profit and For-Profit values being considered as the differences from Government. The introduction of ownership only moderately increases prediction. For-Profit hospitals are observed as having slightly higher efficiency than Non-Profit and Government hospitals. A subsequent analysis comparing least with highly efficient hospitals showed that highly skilled hospitals have lower average costs, high-profit margins, and high labor productivity. The notion of using inputs to produce output has been used to study social efficiency in healthcare (Barnet et al., 2011). Barnet explored the X- efficiency theory, achieved by those hospitals that were able to reduce patient travel costs. For the study, the X-efficiency theory is used concerning the role of

competition in achieving technical efficiency. The output in the study is technical efficiency, competition is the motivating factor, while technical variables are the inputs.

Summary

RQ1 involves the correlation between the technical efficiency and competition across general and Surgical Hospitals in Georgia. Efficiency was calculated and predicted by competition by evaluating the market share, showing the result of a positive relationship. Variables included number of staff beds, average length of stay, and bed occupancy rate, which all affect prices of competition and costs. The general medical and surgical hospitals in Georgia that use their resources effectively can be regarded as highly competitive compared to those who do not use the funds in a manner that ensures better health outcomes with low inputs. The HHI index has been used as an explanatory variable to measure the level of competitiveness in the same way as the study conducted by Deng and Pan (2019). The index indicates the level of market concentration in the health sector; the smaller the HHI, the more competitive the market. According to the existing literature, the HHI greater than or equal to 0.25 is the induction of non-competitive news in the healthcare industry (Deng and Pan, 2019). Narci et al. (2015) further note that HHI is the best measure for objective competition in healthcare. Chua et al. (2011) found a positive relationship between efficiency and HHI scores which signifies the same relationship in the present study. Here, T-tests have been used for hypothesis testing. The t-test shows hypothesis is statistically significant based on the data analyzed. A p-value of < 0.05 was applied as the threshold for declaring statistical significance in the hypothesis test at a confidence interval of 95%. For the first

hypothesis, the p-value is estimated as $< .001$ representing a statistically significant positive correlation between the technical efficiency and competition across general and Surgical Hospitals in Georgia.

RQ2 involves the significant impact on the relationship between competition and technical efficiency across general and surgical hospitals. The result represents a significant model with weak prediction. Analysis cannot be conducted with all three Ownership dummy variables entered. The Government ownership dummy code was not included and can thereby be considered the default case with the Non-Profit and For-Profit values being considered as the differences from Government. The introduction of the ownership variable only moderately increases prediction. For-Profit hospitals are observed as having slightly higher efficiency than Non-Profit and Government hospitals. A subsequent analysis comparing least with highly efficient hospitals showed that highly skilled hospitals have lower average costs, high-profit margins, and high labor productivity. The notion of using inputs to produce output has been used to study social efficiency in healthcare. For the study, the X-efficiency theory was used to address the role of competition in terms of achieving technical efficiency. The output in the study is technical efficiency. Competition is the motivating factor, and technical variables are the inputs.

Section 4: Application to Professional Practice and Implications for Social Change

Interpretation of the Findings

Economic optimality has been identified as efficient in terms of fulfilling basic needs and necessary medical care services. Economic efficiency in medical care can be achieved in terms of social welfare by addressing hospital staff per bed as a unit of energy and HHI as a measure of competition for hospital facilities. The X-Efficiency theory involves mathematical expression while identifying linear relationships between outcome variables and predictors. *Technical efficiency variable = $B_0 + B_1 * \text{Herfindahl-Hirschman Index} + V(\text{control variables}) + \text{Error}$* , whereby B_i is the coefficient of regression and V the control variable. To achieve this, multivariate regression analysis was used which is dependent on cross-sectional data, and results were compared with empirical literature regarding technical efficiency and competition. Competition in the healthcare industry leads to improved efficiency, as it demands outcomes resulting in the improvement of organizational performance.

The present study involved using a descriptive research design and quantitative research approach for determining the existence and magnitude of relationships between competition and technical efficiency in general medical and surgical hospitals in the US using a sample from hospitals in the state of Georgia. General medical and surgical hospitals in the state of Georgia have been used for establishing competitive and technical efficiency. The HHI was calculated by taking the market share of each hospital in the industry and squaring them and summing results. Market share for hospitals is the number of admissions received by the hospital divided by the total number of admissions

in Georgia. The HHI is used by several hospitals such as the Cancer Treatment Center of America, Atlanta Medical Center, and South Georgia Medical Center.

Efficiency scores were calculated using the HHI Index. Input and output variables were used via DEA to calculate hospital efficiency scores. These calculations represent the number of inefficient units that need to reduce their inputs or increase outputs in order to achieve efficiency. Multiple regression analysis was conducted for evaluating the relationship between technical efficiency scores and competition across private, county, and university-owned hospitals in Georgia. HHI scores of each hospital were measured against technical efficiency scores obtained via the DEA-CRR. The relationship between ownership and technical efficiency was tested using technical efficiency scores which are grouped based on whether the hospital was private, public, or university owned. Technical scores for each category were measured individually against specific HHI scores.

Application to Professional Practice

Medical industries across the globe have used various strategies that help in terms of enhancing medical services. Implementation of efficient inputs in medical services has improved ways of treatment and helped in terms of providing better services to individuals. Lack of effectiveness of medical services in the healthcare system has been considered one of the major issues leading to failure of competition. Inefficiency of healthcare in the US and resultant high costs have fueled prevailing concerns involving the sustainability of the healthcare system. Weak efficacy and high costs of healthcare services in the US healthcare system have depressed the economic structure of the nation

and led to depreciated development and potential growth of future generations. This results in minimizing health resources due to poor economic performance, high population growth, and declines in public spending. Policy enactment creates an avenue of competition for various hospitals and encourages use of allocated resources efficiently. Decreased healthcare resources result in careful attention towards productivity and appropriate use of current resources. Therefore, effective use of allocated resources for achieving sustainable healthcare is an important aspect of health improvement. Analyzing the optimal rate of using provided resources is also necessary for ensuring higher efficiency. This results in improving hospital efficiency while promoting mobilization and justification of resource allocation, which can help Achi; lead to better efficiency, which is the responsibility of health administrators.

Competition regarding the delivery of health services among various hospitals in Georgia improves the quality and process of healthcare provision. This means that competition improves quality of service and delivery process as providers enhance their competitive advantage. The competition of general medical and surgical hospitals was analyzed by assessing different factors involving the external environment, strategic mission, and goals in the internal environment. Traditional competition between general medical and surgical hospitals in Georgia involves price, convenience, and services that are provided by practitioners of these healthcare facilities. General medical and surgical hospitals in Georgia are using their resources effectively, which leads to a highly competitive advantage.

Medical and surgical hospitals are majorly influenced by competition in terms of adoption of practices that improve social and economic efficiency. Also, the relationship between competitiveness and technical efficiency in the healthcare system was explored in this study. This study involved investigating the relationship between competition and technical efficiency of general medical and surgical hospitals in Georgia. Technical efficiency was used for measuring increased competition among related healthcare industries. The HHI was used to address market concentration and estimate levels of competition among general medical and surgical provider. The HHI was also used to provide information concerning concentration of hospitals. High HHI levels mean a high concentration of hospitals, thus leading to higher levels of competition. The efficiency level of each technical variable was then compared against HHI scores.

The present study involved the comparison between technical efficiency and competition which has been considered important for analyzing technical variables involving bed size, hospital ownership, poverty rates, insurance coverage, and the total number of beds in general medical hospitals in the county. Also, the attainment of maximum efficiency while utilizing the resources is considered as technical and allocative efficiency. Hence, the present study has been conducted for showing relevancy to the healthcare sectors providing importance of competition among medical institutions that further involves higher competition, thus lowering the cost of treatment and provides efficient and appropriate treatment. The performance of different hospitals in Georgia shows differentiation and the establishment of the relationship between competition and technical efficiency which provides the basis for constructing policies that result in

improving the healthcare providers across the nation. This further influences the patients in choosing general medical and surgical hospitals that are highly efficient because of the utility derived from interaction with the facility.

Implications for Professional Practice and Social Change

Professional Practice

The healthcare system across the globe is changing due to the epidemiology of diseases and major implications of the chronic and devastating conditions among the population. The increased demand for the National Health Service (NHS) and cost of care is improving for providing better medical services to the population (Harrison-Blount et al., 2019). Also, the need for improving the healthcare workforce has been recommended by the government for developing, innovating, and adapting the medical services for meeting the increased healthcare demand. Clinical development has been considered important for professionals for implicating social change in the community towards their health efficiency by providing the patients with high-quality care along with a safe, accessible, bio-psychosocial model of care. Changing the working practices of the healthcare professionals helps in fulfilling the need of providing efficient treatment among the patients. Allied Health Professions into Action identifies the Allied Health Professionals (AHPs) evolving changing potential to lead change, with the benefits of improving health, care, and wellbeing of individuals and populations (Britain & England, 2017). These changing professional practices reveal that people who are more informed, involved, have the ability and confidence to self-manage their conditions, usually experiences better health and quality of life (Schmittdiel et al., 2008). Also, the adoption

of continuing professional development (CPD) has been evolved towards enhancing the educational activities of medical competence and acquiring appropriate, medical knowledge and skills for providing appropriate medical services to the population (Filipe et al., 2014). Along with the professional practice, management, team building, professionalism, interpersonal communication, technology, teaching, and accountability of the healthcare industries are also promoted that uplifts the delivery of medical services. Hence, the adoption of CPD is promoted by many healthcare institutions for achieving effective treatment in hospitals. Principles and guidelines are already explained by some professional societies and world organizations that further explains the core actions to best enhance effective lifelong learning after residency. Hence, dependent upon the well-developed tradition of lifelong learning in the medical profession, CPD integrates every physician's ethical responsibility and increases job satisfaction while providing improved healthcare services to the population. Therefore, all the professional practitioners of the healthcare system are recommended for taking up the services of CPD. Universal guidelines and principles have been framed to develop and maintain CPD complying to best practices for the professional practitioners.

Changes in professional practice have evolved social change by involving the high interest of the community in understanding their health concerns and seeking appropriate care towards the health issues. Several models have been designed concerning the transformation of professional practitioners that involves positive feedback concerning their health care. De-implementation, de-adoption, and de-diffusion are other major theories being adopted by the medical professionals for bringing out the

social change in the society towards the healthcare system (Gnjidic & Elshaug, 2015; Prasad & Ioannidis, 2014).

Positive Social Change

Professional practitioners have been planning their health infrastructure that evolves major treatment efficiency in healthcare centers. The increase in the number of patients in society has evolved the interpretation of the root cause of the occurrence of illnesses. Health administrators majorly contribute towards this interpretation and help in finding the socioeconomic issue while working in the health department. This implicates that healthcare administrators contribute towards finding the major cause of the low-quality healthcare standards by using their techniques such as involving themselves in network to share the new knowledge and adopt best practices and the implementation of health programs that further depends upon the community playing its role to the best. Medical professionals look after every detail of the healthcare model involving medical history, test results, scrutinizing the symptoms, treating the patients, and leading towards efficient clinical measures. These activities of healthcare modeling provide a paternalistic relationship among the patients and the doctors revealing relative success as per the patient's point of view and the providers that provide treatment. Also, this type of approach has evolved the American College of Healthcare Executives (Workers which has represented appropriate standard roles for promoting health and medical services that help in the rectification of the social demand of the general population (Paras & Allaii, 2014). The present scenario reveals the contribution of towards treatment services involving outpatient, acute, chronic, crisis intervention, management that play an

important role in improving the medical infrastructure across hospitals and medical institutions. Some of the major activities involving social change by the medical professionals include the privatization of healthcare during natural disasters, global and national challenges by participating in providing healthcare needs for the patients and their families. The medical professionals in any of the social team help in providing medical help for sorting out the social issues among the patients and their families along with providing better interaction between the patient and the family in healthcare for better recovery of their health. Hence, medical advancements have provided improved quality of life for several people.

The implication for professional practice and social change involves the significance of providing appropriate data concerning the hospital administration and other hospital professionals that are part of hospital management providing medical care and services to the patients. The implications for positive social change involve the potential for hospital administrators and other hospital officials to improve service to patients. The administrators of the hospitals can reduce the cost of healthcare services for the patients who cannot afford high-cost services due to their economic conditions. Also, the reduction in the admission rate among the hospitals has improved the quality of healthcare services in the carious healthcare system.

Limitations of the Study

The study data totaled 98 hospitals which is slightly below minimum sample required for effective results. There are certain limitations that have evolved from the study. The study by Zere et al. (2006) has revealed a major limitation that competition

from public hospitals encourages private health care providers for improving their performance, while public hospitals did not draw motivation from the individual match. Hence, this would result in reducing the performing efficiency of the hospitals which may affect the treatment efficiency in the hospitals. The medical industry is faced with the increased cost of treatment services. Therefore, scholars have raised concerns that come from the significant shortage of resources in health facilities which has been considered to be one of the major limitations involved in the study. The findings of the study by Hsiao et al. (2018) identified that private hospitals were more efficient in providing healthcare as opposed to public hospitals. This further resulted in promoting the private hospital involving higher-cost facilities which cannot be afforded by the major population due to the economic crisis. Hence, this has been proved to be limited for the patients who are economically strong and can afford such high-cost facilities. Another major limitation includes the shortage of health resources that may result due to poor economic performance, high population growth, and a decline in public spending which needs appropriate attention. The availability of very limited healthcare resources is considered as a critical economic reason for providing careful attention to the productivity and appropriate use of current resources.

Conclusion

The current study sought to investigate the impact of Competition on the Technical Efficiency for General Medical and Surgical Hospitals in Georgia. As such, the study sought to answer two main research questions. Efficiency was calculated and predicted in terms of competition by evaluating market shares. Results for RQ2 indicated

a significant model with weak predictions. Analysis could not be conducted with all three ownership dummy variables entered. As such, the government ownership dummy code was not included and was considered the default case with nonprofit and for-profit values being considered as the differences from government. The results showed that the introduction of the ownership variable only moderately increased prediction. For-profit hospitals were observed to have slightly higher efficiency than nonprofit and government hospitals.

The healthcare system is changing globally due to the increased cost of healthcare. Due to disease epidemiology and the increased costs of attending profit-based hospitals, it is continuously becoming high for the individuals despite their technical efficiency and quality services. Communities, therefore, have to venture seriously into the clinical development of the hospitals around them to improve the efficiency and make the NHS facilities more skilled for delivering the best quality care at the affordable prices that they do. In the end, these facilities that hold the healthcare of the community without considering the profit and improving them will ensure that the communities' lives are changed for the better. Communities should therefore concentrate on improving the clinical development in line of technical efficiency to improve the quality of healthcare

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